

Proceedings of the Meeting
of Experts on Forestry Research

Actes de la réunion d'experts
sur la recherche forestière

Deliberaciones de la reunión
de Expertos sobre
Investigación Forestal

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INTRODUCTION

A Meeting of Experts was convened on 12 - 14 October 1992 to discuss the strengthening of forestry research. The meeting was attended by invited experts from national, regional and international forestry research organizations and networks.

Each participant prepared a special paper for discussion, according to a pre-selected theme. There were four themes, corresponding to the four sessions of the meeting, as follows:

- A. Strengthening of national forestry research
- B. Training and development of scientists for forestry research
- C. Research support networks
- D. Global overviews of forestry research

Mr. C.H. Murray, Assistant Director-General, Head of the Forestry Department of FAO, in his opening statement, emphasized that sound management of forests must be based on scientific knowledge of the ecosystem. Moreover, scientific capability should be available locally since forestry problems are site and location-specific. He also drew attention to the fact that the Tenth World Forestry Congress in Paris (September 1991) and the United Nations Conference on Environment and Development in Rio (June 1992) had, in different ways, called for the strengthening and coordination of research and experimentation, for the training of local or native capacity, for the exchange of information on forest management, research and development, and for cooperation in all disciplines related to the sustainable management of forest ecosystems.

The meeting was supported, through sponsorship of various participants, by CIFOR (Center for International Forestry Research), FORSPA (Forestry Research Support Programme for Asia and Pacific) and IUFRO/SPDC (Special Programme for Developing Countries, of the International Union of Forestry Research Organizations). The help of these organizations is gratefully acknowledged.

RECOMMENDATIONS

The Expert Meeting recognizes that forestry research capabilities in many countries are very weak in relation to the immense task of providing necessary scientific and technological support for the sustainable management of forest resources, the rehabilitation of degraded lands, the protection of the environment and the long-term welfare of human communities.

A. On national forestry research, the Expert Meeting recommends

1. That urgent attention be paid to the strengthening of national forestry research systems, with emphasis on those institutions mandated to implement major forestry research programmes but involving also all other relevant components of the system such as universities, NGOs, and the private sector.
2. That where feasible and appropriate, research components be incorporated into forestry development programmes to ensure sustained scientific support for such programmes, through the strengthening of local scientific expertise and institutions.
3. That national self-reliance and sustainability in forestry research be promoted by better identification of clients and their needs, and by increasing the internal sources of funding from the private as well as the public sectors.

B. On the training and development of forestry research manpower, the Expert Meeting recommends

4. That all avenues for training, in-country as well as overseas, and part-time, full-time, 'sandwich', and distance-learning courses, as well as twinning arrangements, be utilized for training.
5. That the academic training of scientists be supplemented by additional training in specific practical skills, implemented through short courses, seminars and other means; such specific skills include research leadership and management, research project formulation and management, research evaluation, technical writing and publication, technology transfer, and impact assessment.
6. That the training and development of scientists be viewed as a

process that should continue into mid-career and beyond, so that skills are continually improved.

C. On research support networks, the Expert Meeting recommends

7. That research support networks be set up on a regional and subregional basis wherever possible in order to promote scientific interaction for the mutual benefit of the scientists and countries concerned.
8. That where appropriate, the Forestry Research Support Programme for Asia-Pacific (FORSPA) be used as a networking model for adaptation to other regions and subregions.
9. That FAO promote and support discussions with relevant national institutions on the operation of regional and subregional forestry research support networks.
10. That efforts be made to explore possibilities for increasing private sector involvement in research networks and exchange of research information.

D. On global support for forestry research, the Expert Meeting recommends

11. That CIFOR and ICRAF, as the pivotal CGIAR centres for international forestry and agroforestry research respectively, should continue to explore creative ways to complement and supplement forestry and agroforestry research support networks.
12. That FAO, IUFRO and CGIAR Centres should continue to work closely with each other and with ITTO and other international organizations to strengthen international support for forestry research.

E. The group of experts expresses its appreciation for this timely and useful meeting and congratulates FAO for convening it; the group recommends

13. That FAO continue to hold Expert Meetings on Forestry Research at regular intervals to provide an inter-regional forum for reviewing the state of forestry research, identifying problems, and exploring options for national, regional and international cooperation and action.

INTRODUCTION

Une réunion d'experts a été organisée du 12 au 14 octobre 1992 pour discuter du renforcement de la recherche forestière. Ont été invités à la réunion des experts d'instituts et réseaux nationaux, régionaux et internationaux de recherche forestière.

Chaque participant avait préparé un exposé sur l'un des quatre thèmes ci-après, correspondant chacun à l'une des quatre sessions de la réunion:

- A. Renforcement de la recherche forestière nationale
- B. Formation et promotion des scientifiques pour la recherche forestière
- C. Réseaux d'appui à la recherche
- D. Aperçu général de la recherche forestière

Dans sa déclaration d'ouverture, M. C.H. Murray, Sous-Directeur général, Chef du Département des forêts de la FAO, a souligné qu'une bonne gestion des forêts doit s'appuyer sur les connaissances scientifiques concernant l'écosystème. En outre, ces connaissances spécialisées doivent être disponibles sur place, car les problèmes forestiers sont spécifiques à un site et à un lieu. Monsieur Murray a également appelé l'attention sur le fait que le dixième Congrès forestier mondial, tenu à Paris en septembre 1991, et la Conférence des Nations Unies sur l'environnement et le développement de Rio (juin 1992) avaient de diverses manières réclamé le renforcement et la coordination de la recherche et de l'expérimentation, la formation de personnel local ou autochtone, l'échange d'informations sur la recherche-développement en matière d'aménagement forestier et la coopération dans toutes les disciplines liées à l'aménagement durable des écosystèmes forestiers.

La réunion a été financée grâce au parrainage de divers participants, par le CIFOR (Centre pour la recherche forestière internationale), le Programme FORSPA de soutien à la recherche forestière dans la région Asie-Pacifique, et le Programme spécial pour les pays en développement de l'Union internationale des instituts de recherches forestières (IUFRO). La FAO remercie ces organismes de leur contribution.

RECOMMANDATIONS

La réunion d'experts reconnaît que les capacités de nombreux pays en matière de recherche forestière sont très insuffisantes, compte tenu de l'immense tâche que représente la fourniture d'un appui scientifique et technologique à la gestion durable des ressources forestières, à la remise en état des terres dégradées, à la protection de l'environnement et au bien-être à long terme des communautés humaines.

A. En matière de recherche forestière nationale, la réunion d'experts recommande:

1. Que le renforcement des systèmes nationaux de recherche forestière soit considéré comme une question urgente, l'accent étant mis sur les institutions chargées de mettre en oeuvre les principaux programmes de recherche forestière, mais aussi sur tous les autres éléments pertinents du système, comme les universités, les ONG et le secteur privé.
2. Que, dans la mesure du possible et en fonction des besoins, des éléments de recherche soient intégrés dans les programmes de développement forestier, afin que ces programmes bénéficient d'un appui scientifique soutenu grâce au renforcement des compétences et des institutions scientifiques locales.
3. Que l'autosuffisance nationale et la viabilité des recherches forestières soient encouragées grâce à une meilleure identification des clients et de leurs besoins, et à un recours accru à des sources de financement internes relevant des secteurs tant privé que public.

B. En ce qui concerne la formation et le perfectionnement des chercheurs en matière forestière, la réunion d'experts recommande:

4. Que toutes les possibilités de formation - dans le pays comme à l'étranger, à temps partiel, à plein temps, en cours d'emploi, à distance, de même que les accords de jumelage - soient utilisées.
5. Que la formation universitaire des scientifiques soit complétée par une formation supplémentaire à des techniques concrètes, dispensées par le biais de stages de courte durée, de séminaires, etc.; que cette formation complémentaire porte sur la direction et la gestion de la recherche, la formulation et la gestion de projets de

recherche, l'évaluation de la recherche, la rédaction et la publication de documents techniques, le transfert de technologies et l'évaluation d'impact.

6. Que la formation et le perfectionnement des scientifiques soient considérés comme un processus continu, devant se poursuivre jusqu'en milieu de carrière, et au-delà de sorte que les compétences ne cessent de s'améliorer.

C. En ce qui concerne les réseaux d'appui à la recherche, la réunion d'experts recommande:

7. Que des réseaux d'appui à la recherche soient créés partout où cela est possible, aux échelons régional et sous-régional, afin de promouvoir les échanges de données scientifiques au profit mutuel des scientifiques et des pays concernés.
8. Que le programme de soutien à la recherche forestière pour l'Asie et le Pacifique serve de modèle pour l'établissement dans d'autres régions et sous-régions de réseaux de ce type.
9. Que la FAO facilite l'organisation de débats avec les institutions nationales pertinentes sur le fonctionnement des réseaux régionaux et sous-régionaux de soutien à la recherche forestière.
10. Que l'on s'efforce d'étudier les moyens d'accroître la participation du secteur privé aux réseaux de recherche et à l'échange d'informations sur la recherche.

D. En ce qui concerne le soutien à la recherche forestière à l'échelon mondial, la réunion d'experts recommande:

11. Que le CIFOR et le CIRAF, en tant que centres du GCRAI pour la recherche forestière internationale et la recherche agroforestière, respectivement, continuent à rechercher des moyens novateurs de compléter et appuyer les réseaux de soutien à la recherche forestière et agroforestière.
12. Que la FAO, l'IUFRO et les centres du GCRAI continuent à collaborer étroitement entre eux et avec l'Organisation internationale des bois tropicaux et d'autres organisations internationales, afin de renforcer le soutien international à la

recherche forestière.

E. Le Groupe d'experts se félicite que cette réunion qui s'est avérée fort utile ait pu être organisée en temps opportun, grâce à la FAO. Le Group d'experts recommande:

13. Que la FAO continue à organiser à intervalles réguliers des réunions d'experts sur la recherche forestière qui servent de forum interrégional pour l'examen des progrès accomplis en matière de recherche forestière, l'identification des problèmes et l'étude des moyens de coopération et d'action aux échelons national, régional et international.

INTRODUCCION

Del 12 al 14 de octubre de 1992 se convocó una reunión de expertos para debatir el tema de la intensificación de las investigaciones forestales. A la reunión fueron invitados expertos de organizaciones y redes nacionales, regionales e internacionales de investigación forestal.

Cada uno de los participantes preparó un documento especial para debate, según un tema previamente seleccionado. Los cuatro temas, correspondientes a las cuatro sesiones de la reunión, fueron los siguientes:

- A. Intensificación de las investigaciones forestales nacionales
- B. Capacitación y perfeccionamiento de científicos dedicados a la investigación forestal
- C. Redes de apoyo a la investigación
- D. Panorama general de la investigación forestal

El Sr. C.H. Murray, Subdirector General, Jefe del Departamento de Montes de la FAO, puso de relieve, en su alocución de apertura, el hecho de que una ordenación adecuada de los bosques debe basarse en los conocimientos científicos del ecosistema. Además, habría que disponer localmente de la necesaria capacidad científica ya que los problemas forestales son específicos del lugar y la ubicación. Señaló también a la atención de los presentes el hecho de que, en el Décimo Congreso Forestal Mundial celebrado en París en septiembre de 1991 y en la Conferencia de las Naciones Unidas sobre el Medio Ambiente y el Desarrollo, de Río (junio de 1992), se había pedido, de maneras diferentes, que se refuerce la coordinación de las investigaciones y de los experimentos, para la capacitación del personal local o nativo, el intercambio de información sobre investigación y desarrollo de la ordenación forestal y para la cooperación en todas las disciplinas relacionadas con la ordenación sostenible de los ecosistemas forestales.

La reunión contó con el apoyo y el patrocinio de varios participantes, del CIFOR (Centro Internacional de Investigación Forestal), el FORSPA (Programa de Apoyo a la Investigación Forestal para Asia y el Pacífico), y el IUFRO/SPDC (Programa Especial para los Países en Desarrollo de la Unión Internacional de Organizaciones de Investigación Forestal). Se reconoció y agradeció la ayuda de estas organizaciones.

RECOMENDACIONES

La Reunión de Expertos reconoce que la capacidad de investigación forestal que existe en muchos países es muy deficiente si se compara con la formidable tarea de facilitar el necesario apoyo científico y tecnológico para la ordenación sostenible de los recursos forestales, la rehabilitación de las tierras degradadas, la protección del medio ambiente y el bienestar de las comunidades humanas a largo plazo.

A. Por lo que respecta a la investigación forestal nacional, la Reunión de Expertos recomienda:

1. Que se dedique atención urgente a reforzar los sistemas nacionales de investigación forestal, dando preferencia a aquellas instituciones encargadas de poner en práctica programas de investigación forestal importantes, pero haciendo participar también a otros componentes relevantes del sistema como las universidades, las ONG y el sector privado.
2. Que siempre que sea viable y adecuado, se incorporen elementos de investigación a los programas de desarrollo forestal a fin de garantizar un apoyo científico continuo a dichos programas, a través de la intensificación de los conocimientos técnicos e instituciones científicas locales.
3. Que se fomente la autosuficiencia nacional y el carácter sostenible de la investigación forestal mediante una mejor elección de los clientes y sus necesidades, y el aumento de las fuentes internas de financiación procedentes de los sectores privado y público.

B. En cuanto a la capacitación y perfeccionamiento de los recursos humanos en materia de investigación forestal, la Reunión de Expertos recomienda:

4. Que para la capacitación se utilicen todos los sistemas de formación - dentro del propio país y en ultramar - cursos a tiempo parcial, a tiempo completo, alternados con el trabajo y a distancia, así como actividades paralelas.
5. Que la capacitación académica de científicos esté complementada con una formación adicional en conocimientos prácticos específicos,

mediante cursillos, seminarios u otros medios, y que dichos conocimientos específicos incluyan dirección y gestión de las investigaciones, formulación y administración de proyectos de investigación, evaluación de las actividades de investigación, redacción y publicación de textos técnicos, transferencia de tecnología y evaluación de los efectos.

6. Que la capacitación y perfeccionamiento de científicos se considere un proceso continuo durante y una vez terminada la carrera, destinado a mejorar continuamente las técnicas.

C. Respecto a las redes de apoyo a la investigación, la Reunión de Expertos recomienda:

7. Que, siempre que sea posible, las redes de apoyo a la investigación se creen, sobre una base regional y subregional a fin de fomentar la interacción científica en beneficio mutuo de los científicos y los países interesados.
8. Que, cuando proceda, el Programa de Apoyo a la Investigación Forestal para Asia y el Pacífico (FORSPA) se utilice como modelo de red tras su adaptación a otras regiones y subregiones.
9. Que la FAO fomente y apoye los debates con las instituciones nacionales idóneas sobre el funcionamiento de las redes de apoyo a la investigación forestal regionales y subregionales.
10. Que se procure explorar la posibilidad de aumentar la participación del sector privado en las redes de investigación y el intercambio de información sobre el tema.

D. En cuanto al apoyo mundial a la investigación forestal, la Reunión de Expertos recomienda:

11. Que el CIFOR y el ICRAF, así como los centros del GCIAI más importantes en lo que respecta a la investigación forestal internacional y a la agrosilvicultura respectivamente, continúen explorando la posibilidad de complementar y suplementar de forma creativa la red de apoyo a la investigación forestal y agroforestal.
12. Que la FAO, el IUFRO y los centros del GCIAI continúen colaborando estrechamente entre ellos y con la Organización

Internacional de las Maderas Tropicales (ITTO) así como con otras organizaciones internacionales, a fin de reforzar el apoyo internacional a la investigación forestal.

E. El grupo de expertos manifiesta su agradecimiento por esta oportuna y útil reunión, felicita a la FAO por haberla convocado y recomienda:

13. Que la FAO continúe celebrando reuniones de expertos sobre investigación forestal a intervalos regulares, que constituyan un foro interregional para revisar la situación de las investigaciones forestales, determinar los problemas y explorar las opciones para la cooperación y la acción nacionales, regionales e internacionales.

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FORTALECIMIENTO DE LAS INSTITUCIONES DE INVESTIGACION FORESTAL: MEXICO

por

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Abstract

In Mexico, there are about 44 organizations, mainly universities and some institutes, related with forestry research. The main organization, INIFAP (Instituto Nacional de Investigaciones Forestales y Agropecuarias), was created in 1985 when the three national research institutes INIA (crops), INIP (animals) and INIF (forest) were merged.

In order to increase and improve the capability, effectiveness and efficiency of research organizations, suggestions include: (1) specialized training for human resources, (2) creation of data bases and electronic communication systems between institutes, (3) building and strengthening laboratories, libraries and other facilities in experimental stations, (4) promoting and establishing specific cooperation networks at national and regional levels, (5) promoting and increasing the cooperation between institutions working in forestry research, (6) promoting the exchange of knowledge and expertise and increasing the technical assistance to producers and technicians, and (7) diversification of financial funding.

Resumen

Se han identificado 44 instituciones que realizan investigación forestal, destacando universidades, institutos y organismos gubernamentales. El INIFAP (Instituto Nacional de Investigaciones Forestales y Agropecuarias) es la institución más importante. INIFAP fue creado en 1985 a partir de la fusión de los tres Institutos Nacionales de Investigaciones, Agrícolas, Pecuarias y Forestales, con el objetivo de incrementar y mejorar la eficiencia y eficacia de las actividades de investigación en el sector agropecuario y forestal del país.

Para que se pueda fortalecer la investigación forestal en México

y pueda constituirse en un complemento efectivo y apoye los esfuerzos de organismos internacionales que actúan en este campo de la ciencia. Se sugieren las siguientes acciones: (1) entrenamiento especializado de los recursos humanos, (2) establecimiento de mecanismos de comunicación electrónica y bases de datos, (3) establecer y reforzar instalaciones de laboratorios, bibliotecas, facilidades para investigación en los campos experimentales disponibles, (4) establecer redes de investigación a nivel regional, (5) propiciar la asociación entre instituciones de investigación, (6) promover el intercambio de experiencias y asistencia técnica forestales, (7) diversificar las fuentes de financiamiento.

La investigación agropecuaria y forestal en México

La institución del gobierno federal responsable de realizar la investigación y desarrollo para generar conocimientos y tecnologías en el sector agropecuario y forestal en México, es el Instituto Nacional de Investigaciones Forestales y Agropecuarias (INIFAP), dependiente de la Secretaría de Agricultura y Recursos Hidráulicos (SARH).

El INIFAP se formó en agosto de 1985, a partir de la fusión de los institutos nacionales de investigaciones forestales (INIF), agrícolas (INIA) y pecuarias (INIP). El INIFAP es un órgano administrativo desconcentrado de la SARH; las atribuciones del instituto provienen del Reglamento interior de dicha Secretaría, la Ley de Producción, Certificación y Comercio de Semillas y de la Ley Forestal.

Su estructura orgánica actual consiste de un nivel central con funciones de planeación indicativa, organización, normatividad y dirección, integrado por un Órgano de Gobierno, una Vocalía Ejecutiva, un Comité Técnico, tres Divisiones subsectoriales (agrícola, forestal y pecuaria) y dos direcciones generales (Coordinación y Desarrollo, y Administración). En el nivel foráneo se integra por 8 Centros de Investigación Regional (CIR), 5 Centros de Investigación Disciplinaria (CENID), 32 direcciones de coordinación y vinculación en los estados y 87 campos experimentales diseminados en la geografía nacional y que dependen directamente de los 8 Centros de Investigación Regional.

Para realizar su tarea en México, por sistema - producto, disciplina o problema, el INIFAP cuenta con 1746 investigadores (marzo de 1992), de los cuales 1130 (65 %), realizan su trabajo de investigación en la División agrícola, 408 (23 %) en la División pecuaria y 208 (12 %) en la División forestal. Los investigadores se encuentran distribuidos en todo el país y realizan su trabajo a partir de la unidad básica constituida por los Campos

Experimentales.

Situación del sector agropecuario y forestal

La situación económica, social y política actual del país, motivó al Gobierno Federal a tomar medidas que han propiciado la apertura comercial, iniciada hace varios años con el ingreso al Acuerdo General de Tarifas y Comercio (GATT) y ratificada con la firma de tratados de libre comercio, como el signado entre Canadá, Estados Unidos y México. Esta apertura abre nuevas perspectivas comerciales para México pero también significa una fuerte competencia del sector agropecuario y forestal del país con los de naciones más desarrolladas, como Estados Unidos y Canadá.

Otras medidas importantes son la disminución progresiva de los subsidios de todo tipo con tendencia a su eliminación; las medidas tomadas para controlar la inflación, iniciadas a partir de 1987; el control y disminución de la deuda externa, que han repercutido en una disminución del gasto público y han tenido efectos muy significativos en el sector agropecuario y forestal.

Las reformas al artículo 27 Constitucional, relativas a la tenencia de la tierra, presentan nuevas oportunidades de desarrollo para los propietarios y poseedores asociados a capitales de origen privado o público y con ello se garantiza la tenencia de la tierra y las inversiones a largo plazo.

El país presenta altas tasas de crecimiento de su población y una fuerte emigración del campo hacia las ciudades y hacia el exterior del país, en busca de oportunidades de empleo y de una vida mejor.

La situación económica del país se refleja fuertemente en el sector agropecuario, así la mayor exposición al comercio internacional abre perspectivas halagadoras a productos de exportación, tanto actuales como potenciales. Esto también ha afectado a los productores de consumo interno, quienes tienen que soportar la competencia externa favorecida por una fuerte política de subsidios de los países desarrollados.

La disminución de subsidios al crédito y al seguro, a los principales insumos, a los recursos genéticos vegetales y animales y a la comercialización, sumados al incremento del costo de la maquila para la preparación de la tierra, siembra, fertilización, cultivos y cosecha, han determinado que los costos de producción se eleven.

Las disminuciones presupuestales han sido tan fuertes en el sector y particularmente en la SARH, que aún cuando el INIFAP mejoró en su posición relativa dentro de ésta (de 2.8 % en 1980 a 4.1 % en 1990) en relación con el producto interno bruto Agropecuario y Forestal, se ha reducido significativamente (de 0.72 % en 1980 a 0.29 % en 1990) y las

perspectivas para años subsiguientes señalan que la disponibilidad de recursos fiscales presenta una tendencia descendente.

Las restricciones y cambios que han impactado al sector en la última década, han propiciado una disminución o estancamiento en los ritmos de crecimiento de los rendimientos de algunos productos agropecuarios y forestales, que han dado como resultado mayores rezagos en las áreas de temporal y en las regiones tropicales.

Las posibilidades de aumento de la producción agropecuaria y forestal con base en la expansión de la frontera agrícola son muy limitadas, ya que sólo se podría disponer de tierras de temporal y tropicales marginales a costos muy altos; por otro lado la incorporación de tierras al riego es comparativamente costosa, por lo tanto, el crecimiento de la producción se tiene que basar en el aumento de los rendimientos, es decir con la aplicación de nuevas tecnologías de producción.

También debe señalarse como muy importante el evidente y fuerte deterioro que han sufrido los recursos naturales (suelo, agua, vegetación forestal y fauna silvestre), por la presión de la población en crecimiento y por la falta de recursos para su conservación.

La actividad forestal en México

La superficie forestal de México es de 143.6 millones de hectáreas. Se constituye por 38.9 millones arboladas de las que 27.5 millones son de bosques de coníferas y latifoliadas de clima templado y frío y 11.4 millones de bosques tropicales húmedos. El resto, 104.7 millones de hectáreas, lo constituyen diversos tipos de vegetación propia de las zonas áridas y semiáridas, bosques tropicales secos, áreas perturbadas y de vegetación hidrófila.

Los bosques de clima templado y frío, están constituidos por coníferas, principalmente del género *Pinus* y diversas latifoliadas, siendo los más importantes productores de madera. Las especies de pino aportan el 70 % de la producción maderable del país; además en éstos bosques existen otras especies productoras de madera como el oyamel (*Abies*), encinos (*Quercus*), fresno (*Fraxinus*), aile (*Alnus*), entre otras.

Los bosques tropicales húmedos producen una gran variedad de maderas tanto de las llamadas preciosas, representadas por cedro (*Cedrela odorata*) y caoba (*Swietenia macrophylla*), como las denominadas comunes tropicales, las más abundantes y variadas, que incluyen especies como el ramón (*Brosimum alicastrum*), tzalam (*Lysiloma bahamensis*), pucté (*Bucida buseras*), jabin (*Piscidia comunis*), entre otras.

De los bosques tropicales húmedos y secos también se obtienen diversos

productos no maderables como el barbasco (*Dioscorea composita*), fuente de diosgenina para productos medicinales, látex de chicle (*Manilkara zapota*), frutos, plantas de ornato, entre otros.

Las zonas áridas y semiáridas de México, generan una gran variedad de productos forestales no maderables sobresaliendo en el norte y noreste del país la cera de candelilla (*Euphorbia anthysiphylitica*), la fibra de lechuguilla (*Agave lechuguilla*), el oregano (*Lipia spp*) y numerosas cactáceas productoras de frutos comestibles, entre otras.

Por otro lado en el noroeste de México, sobresale la producción de jojoba (*Simondsia chinensis*), damiana (*Turnera diffusa*) y frutos de diversas cactáceas.

En las regiones Noreste y Noroeste del país los pastizales y los arbustos forrajeros y productores de leña combustible constituyen un importante recurso para sus pobladores.

Para 1991 la producción forestal en aprovechamientos regulados en México, ascendió a 9.5 millones de metros cúbicos rollo, considerándose que el potencial anual de los bosques de clima templado y frío y tropicales es de más de 25 millones de metros cúbicos rollo anuales.

De la producción maderable nacional, el 55 % se destina a madera aserrada, el 30 % a productos celulósicos, el 7 % a contrachapados y el 8 % restante a otros productos.

La producción nacional concurre básicamente a los mercados locales y aunque existe autosuficiencia en varios productos forestales, sólo se exporta alrededor del 5 % del total nacional y se importa el 30 % del total requerido para satisfacer la demanda interna, que corresponde en su mayoría a productos celulósicos.

Los rubros de caminos y transporte, según la región del país, inciden entre el 40 y 70 % del costo total de la producción de madera en rollo.

La tasa de pérdida de recursos forestales ha manifestado una tendencia creciente y de continuar en esa forma se estima que en los próximos 10 años se perderán alrededor de 3 millones de hectáreas cubiertas de vegetación, especialmente en la región del trópico húmedo.

La administración forestal fomenta la prestación de servicios técnicos a través de Unidades de Conservación y Desarrollo Forestal, financiadas por los productores y con supervisión de la Secretaría de Agricultura y Recursos Hidráulicos, a través de la Subsecretaría Forestal y de Fauna Silvestre.

En 1990 la industria nacional se integró por 2416 establecimientos: 954 son plantas de aserrío, 1182 de producción de cajas de empaque, 76 de tableros de madera, 70 de celulosa y papel, 21 plantas impregnadoras, 18

resineras y 106 talleres secundarios. Dentro de la planta industrial existen también empresas dedicadas a la producción de molduras, artefactos de madera, carbón, comprimidos de carbón y extracción de colorantes vegetales.

La investigación forestal

En México se han identificado 44 diferentes organizaciones que están vinculadas de alguna forma a la investigación forestal y a la gestión de recursos naturales. Entre ellas destacan Universidades, Institutos y Organismos Gubernamentales y otros que realizan investigación ligada al conocimiento y aprovechamiento de los ecosistemas forestales, principalmente en estudios relacionados con la biología de los organismos forestales, funciones de los ecosistemas y manejo de los bosques, utilización de los recursos naturales maderables y no maderables, conservación y mejoramiento de los recursos genéticos forestales y las interacciones del hombre con los recursos naturales y su aprovechamiento, entre las áreas del conocimiento más importantes.

La mayoría de las instituciones tienen una cobertura limitada tanto en el enfoque de sus actividades como en el número y distribución de sus recursos humanos; disponen de instalaciones modestas y en la mayoría de los casos con equipamiento escaso; pocas instituciones disponen de Campos o Estaciones Experimentales donde realizar sus trabajos de investigación.

Considerando la infraestructura, número de investigadores, campos experimentales, cobertura nacional y por el hecho de ser el órgano oficial de investigación forestal del gobierno de México, se tomará como referencia al INIFAP para analizar las necesidades de fortalecimiento institucional, a partir de su situación actual y potencial, para participar en la investigación requerida a nivel internacional.

A continuación se comentan las principales características de la investigación forestal.

Objetivos

El INIFAP tiene como objetivos generales, de su investigación forestal, generar y adaptar conocimientos y tecnologías para:

- 1 Aumentar la producción y la productividad a través de la diversificación de actividades, el manejo integrado y el desarrollo sostenible.
- 2 Proteger y fomentar el recurso forestal, garantizando el equilibrio ecológico y la conservación de los recursos naturales.
- 3 Coadyuvar en el desarrollo de las comunidades forestales

incrementando la productividad y la calidad de sus productos al mínimo costo posible, con la finalidad de hacer más competitivo el subsector.

- 4 Validar, divulgar y apoyar la transferencia de resultados a los usuarios de la investigación.

Para lograr estos objetivos la División Forestal de INIFAP contempla los siguientes enfoques generales de la investigación:

La producción maderable puede obtenerse en los bosques y selvas naturales y en plantaciones comerciales.

Desarrollar esquemas eficientes para el establecimiento y manejo de plantaciones con especies de rápido crecimiento o de alto valor económico. En el caso de la producción en plantaciones comerciales, se deben resolver algunas interrogantes relacionadas con el germoplasma que se utiliza, su mejoramiento y conservación, y la exploración de los cuantiosos recursos genéticos contenidos en los ecosistemas tropicales.

Mejorar los sistemas de producción de planta, para hacerlos eficientes y con niveles de costos adecuados y explorar las metodologías que requieren especies no tradicionalmente utilizadas en plantaciones y que representan un alto potencial.

Comprender y resolver los problemas investigables relacionados con el abastecimiento, industrialización y comercialización de los productos forestales.

Para el desarrollo de la producción forestal en los bosques y selvas es importante contemplar investigación que resuelva los problemas que se enfrentan en: la evaluación e inventario de los recursos; el manejo integral de ellos con bases de sostenibilidad de la producción; y la protección de los recursos, principalmente de plagas, enfermedades e incendios.

Estudiar y conocer el régimen hidrológico, que permita un mejor aprovechamiento de los recursos derivados para beneficio tanto de los asentamientos humanos como de los propios ecosistemas.

Para los recursos no maderables, propios de los ecosistemas de las regiones árida y semiárida, tropical húmeda y seca y templada y fría, los enfoques se conducen hacia generar conocimientos y tecnologías para evaluarlos, manejarlos, mejorar genéticamente sus poblaciones, propiciar su protección y promover su cultivo para establecer plantaciones que permitan la industrialización y comercialización de los productos en ellas contenidos.

Vinculación con instituciones del sector

Actualmente se ha fortalecido el vínculo entre las instancias operativas que

manejan la política forestal y el INIFAP, generándose programas orientados hacia satisfacer necesidades reales de los productores que incidan en incrementar la eficiencia y productividad de las operaciones forestales, disminuyendo los costos que dichas acciones implican.

Por otro lado la cooperación con instituciones de investigación y enseñanza ha continuado en forma creciente y se ha fortalecido a últimas fechas. Se ha programado realizar la primera reunión de instituciones de investigación forestal con el objetivo de propiciar la cooperación entre los institutos y universidades buscando la complementariedad de acciones y programas que lleven a evitar duplicación de esfuerzos y competencia innecesarias.

En julio pasado se firmó una carta de intención entre el INIFAP y el Servicio Forestal de Estados Unidos con el objetivo de propiciar la asociación de científicos de ambos países para realizar trabajos conjuntos de investigación en 7 grandes tópicos : Biología de los organismos forestales; Funcionamiento y manejo de sistemas ecológicos; Interacciones hombre - bosque; Madera como materia prima; Competencia, cooperación y comercio internacional; Silvicultura tropical y Programas especiales.

Se encuentra en proceso de análisis un convenio de cooperación entre INIFAP y el ICRAF, cuyo objetivo se centra en la realización conjunta de actividades de investigación y desarrollo en agrosilvicultura y los efectos de la quema de vegetación sobre el medio ambiente.

Recursos actuales para la investigación forestal

Para realizar su tarea en México, la División forestal del INIFAP cuenta con 208 investigadores, de los cuales 120 (58 %) se concentran en la región templada y fría, atendiendo los bosques de coníferas y latifoliadas; 42 (20 %) a cargo de los bosques tropicales húmedos y secos; 28 (13.4 %) en las regiones árida y semiárida y 18 (8.6 %) se encuentran realizando estudios de posgrado.

En cuanto a su formación académica, del total de investigadores en activo (190) 13 cuentan con Doctorado, 39 con maestría y 138 únicamente con licenciatura.

La División de investigación forestal del INIFAP, cuenta con 10 Campos Experimentales en los que se dispone de cierta infraestructura y facilidades de oficinas, laboratorios y pequeñas bibliotecas, cinco de ellos localizados en la región templada y fría, dos en la árida y semiárida, tres en la tropical húmeda y uno en la tropical seca, donde se ubica una importante infraestructura de laboratorios, con recursos y equipamiento modesto para cubrir las demandas de la región tropical (húmeda y seca)

del sureste del país.

Situación de la investigación forestal

Algunos factores que se han presentado en los últimos diez años, sumados a la situación económica que vive el país, han dado como resultado efectos acumulados que han influido en el desarrollo de la investigación y en la permanencia de los investigadores. Entre ellos deben mencionarse los siguientes:

Dispersión de la investigación

Actualmente existe un gran número de proyectos, dispersión geográfica de los grupos de investigadores, apoyos insuficientes a las redes de investigación. Menor intensidad y atención a las áreas tropicales y áridas; insuficiencia de cobertura en algunos campos de la actividad como son la biología de los organismos forestales, el manejo integral de los recursos, la utilización y comercialización de los productos maderables y no maderables, la conservación y aprovechamiento de los recursos genéticos y la validación y transferencia de tecnología a los productores forestales.

Como consecuencia de lo anterior el impacto de la investigación sobre la producción es mínimo y se favorece la brecha tecnológica, entendida como la diferencia entre los rendimientos potenciales y los reales obtenidos por los productores, lo cual tiene una mayor repercusión en los ecosistemas tropicales.

Recursos humanos

En el caso del personal científico se ha sufrido una importante erosión por falta de estímulos económicos y de recursos para la investigación. También ha influido la insuficiencia de fondos disponibles para su formación y actualización. El número de investigadores forestales en el INIFAP descendió de 350 en 1987 a 208 en 1990-91.

El personal técnico de apoyo a los investigadores también ha disminuido sustancialmente, debido a programas gubernamentales de retiro voluntario y racionalización de contrataciones. El personal técnico que permanece apoyando acciones de investigación, requiere de capacitación y entrenamiento, para hacer más efectiva su labor.

Recursos financieros para la investigación

Se requiere reforzar el sistema de asignación de recursos (prioridades, planeación estratégica, plazos de ejecución, programación -presupuestación) y el de información sobre los programas en marcha, de

administración de los recursos y de gestión de la investigación, que han sufrido un intenso proceso de obsolescencia.

La insuficiencia presupuestal en términos reales, ha sido una característica en casi todo el decenio anterior. Los recursos asignados presentaron una baja relación entre el gasto de operación y el gasto corriente, que provocó una fuerte disminución en el mantenimiento de laboratorios, bibliotecas, edificios, vehículos, maquinaria y equipo, lo que sumado a los escasos recursos de inversión destinados a reponer estos activos, trajo como consecuencia el deterioro y destrucción de muchos de éstos recursos.

Recursos físicos

En general la investigación agropecuaria y forestal ha venido careciendo, desde hace diez años, de equipos y materiales de biblioteca, existe un fuerte rezago en suscripciones a revistas especializadas y de libros; Las instalaciones se encuentran deterioradas y existe insuficiencia o falta de instalaciones y equipo para programas estratégicos como recursos genéticos, tecnología de semillas, biotecnología y falta de maquinaria y equipo de uso común en las actividades forestales. En general existe un rezago en la adquisición de vehículos y equipo científico y de equipo de computación y de comunicación electrónica.

Vinculación de la investigación

La vinculación de la investigación con los organismos de productores, asistencia técnica, empresas relacionadas a la actividad, instituciones de enseñanza e investigación nacionales y de otros países, ha sido insuficiente y debe ser alentada. Lo anterior se traduce en la poca efectividad de penetración de los resultados de investigación en los procesos operativos.

Fortalecimiento de la investigación forestal

En los últimos años la comunidad internacional, preocupada por los cambios ambientales provocados por la acción del hombre sobre los ecosistemas naturales, ha dedicado mayor interés a las actividades forestales que se realizan en todo el mundo, principalmente en las comunidades tropicales.

Destaca por su importancia la acción emprendida por el Grupo Consultivo para la Investigación Agrícola Internacional para fundar el Centro Internacional para la Investigación Forestal (CIFOR).

Considerando el avance realizado en la planeación y estructuración del CIFOR, es importante reflexionar en el papel que jugarán las instituciones

nacionales que desarrollan actividades de investigación forestal, tanto en el papel de socios de organizaciones similares de otros países como del CIFOR y su participación en las redes regionales de investigación, que permitan complementar y apoyar directamente los esfuerzos nacionales de investigación.

La cooperación internacional en la investigación forestal, indudablemente traerá ventajas incomparables para solucionar problemas comunes que rebasan las fronteras nacionales, sin embargo, será necesario fortalecer a los institutos nacionales en varios caminos, para que puedan enfrentar con el mismo nivel de competencia las tareas comunes que se señalen.

Entre las principales actividades que se pueden identificar como prioritarias para el fortalecimiento de las instituciones nacionales de investigación forestal se pueden señalar:

- 1 Entrenamiento especializado de los recursos humanos, tanto en cursos cortos de actualización como en la obtención de grados (maestría y doctorado), en disciplinas de alta prioridad.

El entrenamiento de los recursos humanos permitirá que las instituciones de investigación puedan capacitar mejor a su personal para identificar problemas, conducir trabajos de investigación y desarrollar y/o adaptar tecnología; al mismo tiempo se logra una transferencia de tecnología del centro de capacitación hacia la institución a la que pertenece el capacitando.

Capacitación de los recursos humanos para reforzar las acciones de validación y transferencia de tecnología a los usuarios.

- 2 Establecimiento de mecanismos de comunicación electrónica y bases de datos, entre todos los institutos participantes y de éstos con el CIFOR, para propiciar el intercambio de experiencias y el conocimiento de las actividades de investigación que realizan los diversos grupos y evitar duplicaciones innecesarias.

Lo anterior permitirá enlazar a las diferentes instituciones participantes en las redes de investigación para, en el corto plazo, mejorar sustancialmente la comunicación entre ellas y hacia el interior de sus organizaciones.

Es importante establecer sistemas de información estandarizados y oportunos, que cubran los aspectos relacionados con los trabajos en marcha en investigación y la transferencia de tecnología; de información científica y técnica, reforzando el sistema de bibliotecas y de consultas

bibliográficas y establecer los medios físicos que guarden proporción con las diferentes necesidades de las organizaciones participantes y que sean compatibles entre sí para alcanzar un intercambio fluido de información.

Es importante interconectar los sistemas de comunicación, información y de procesamiento de datos para lograr un flujo mayor de información en menos tiempo y una comunicación más ágil tanto al interior de cada organización como entre ellas.

Una medida con la naturaleza de la planteada puede favorecer el esquema general de operación propiciando un mayor conocimiento de lo que se hace en cada institución, el mejor aprovechamiento del conocimiento disponible y una mayor eficiencia en los trabajos realizados, sin duplicar esfuerzos.

También tendría efecto en acelerar la obtención y transmisión de resultados de investigación, en mejorar los sistemas de planeación y el seguimiento y evaluación de la investigación. Así mismo, la información que se obtenga será más completa, tendrá el carácter de agregable y será más oportuna. Además puede influir en aumentar la eficacia y eficiencia en la toma de decisiones en y entre las instituciones participantes.

- 3 Propiciar el establecimiento y/o reforzamiento de instalaciones para Campos Experimentales, bibliotecas y laboratorios, disponible en algunos países, para permitir que los investigadores cuenten con las facilidades mínimas necesarias para cumplir su tarea.

Esta medida permitirá también contar con instalaciones adecuadas para servir de base de operación a equipos de trabajo multinacionales y de las redes de investigación.

- 4 Establecimiento de redes de investigación a nivel regional, que permitan una cobertura amplia en términos geográficos y una mejor utilización de los recursos disponibles y evite duplicaciones innecesarias.
- 5 Propiciar la asociación entre las instituciones de investigación, de las diferentes regiones y de éstas con organismos no gubernamentales, para realizar acciones complementarias de investigación y/o desarrollo para la solución de problemas y evitar competencia y duplicación de esfuerzos entre ellos.
- 6 Promover el intercambio de experiencias y la asistencia técnica entre

instituciones de investigación de países desarrollados y en desarrollo, propiciando la estancia de investigadores altamente capacitados en los institutos nacionales de investigación, como parte de sus actividades en años sabáticos o en proyectos especiales de alta prioridad.

- 7 Diversificar las fuentes de financiamiento para obtener mayor apoyo financiero, interés y conocimiento por parte de los productores, de los gobiernos estatales o provinciales y municipales, así como del sector empresarial. Lo anterior puede influir en la disminución de costos de investigación cuyos resultados podrían aplicarse en otros países y tener mayor vinculación con instituciones del exterior, aumentando el conocimiento del trabajo que se realiza y facilitando la transferencia de tecnología hacia el exterior.

La diversificación financiera puede lograrse a través de varios mecanismos, entre los que destacan:

Crear patronatos y otras figuras asociativas de apoyo a la investigación formados por productores e industriales forestales.

Aumentar el apoyo financiero de gobiernos estatales y municipales para las investigaciones que ayuden a resolver problemas o atender necesidades o aprovechar oportunidades importantes en las áreas de su jurisdicción.

Aumentar los apoyos de organismos internacionales, fundaciones y agencias de desarrollo de otros países, centros internacionales de investigación, entre otros, para las investigaciones cuyos resultados puedan ser aplicadas en otros países.

Ampliar la concertación de proyectos de investigación con institutos de investigación forestal y universidades de otros países, para abordar problemas de interés común, compartiendo los gastos y buscando conjuntamente financiamiento de agencias internacionales.

Incrementar los ingresos propios que puedan ser reciclados a investigación, a través de mecanismos de producción de bienes y servicios, contratos de asistencia técnica y otros mecanismos similares.

Redes de investigación regional

El establecimiento de redes de investigación, se considera de mucha importancia para propiciar intercambio de ideas y conocimientos en una región, para resolver problemas comunes que se presentan simultáneamente en varios países. Su creación y/o fortalecimiento debe obedecer a necesidades específicas y su cobertura regional debe planearse para cubrir áreas geográficas con características y problemas semejantes.

Es importante fortalecer las redes de investigación relacionadas con los programas prioritarios para mejorar la ejecución de los mismos. Para ello se deben proveer recurso que permitan darles suficiente movilidad a los investigadores que participen en ellas, para poder realizar funciones fundamentales de planeación, programación y diseño de las actividades de las redes en los diferentes países, así como la supervisión y evaluación de los avances y resultados de los proyectos de investigación.

Facilitar la actualización de sus conocimientos, propiciando la asistencia de los investigadores participantes a cursos cortos, congresos, reuniones de especialistas, entre otros, para que continúen ejerciendo con eficacia el liderazgo científico

Facilitarles los medios de comunicación y de información científica necesarios para el eficaz cumplimiento de sus funciones y dotarlos con los medios físicos para la captura, procesamiento y análisis de la información, para planear, programar, darle seguimiento y evaluar los proyectos a su cargo.

Reunión de Instituciones de Investigación Forestal de México

Con el propósito de ofrecer un foro de análisis y planeación y promover la colaboración entre las instituciones de investigación forestal de México, durante los días 21 al 24 de octubre de 1992, se celebró, en la Cd. de Campeche, Campeche, México, la Primera Reunión Nacional de Instituciones de Investigación Forestal, buscando: conocer la situación actual de la investigación forestal en México; establecer bases de coordinación para desarrollar acciones de complementariedad entre las instituciones y promover nuevas estrategias para la atención de problemas comunes a las instituciones como financiamiento, formación de recursos humanos, entre otros.

Organizaron esta reunión la Secretaría de Agricultura y Recursos Hidráulicos a través del INIFAP (División Forestal) conjuntamente con algunas Instituciones de Enseñanza superior e Investigación como: Instituto Politécnico Nacional (Escuela Nacional de Ciencias Biológicas), Universidad Autónoma Chapingo, Colegio de Posgraduados (Programa Académico Forestal), Universidad Autónoma de Campeche.

A la fecha se han registrado 44 instituciones y durante el evento se contará con la participación a través de ponencias magistrales de renombrados especialistas de países con tradición forestal, organismos internacionales y de la autoridad forestal de México.

RENFORCEMENT DE LA RECHERCHE FORESTIERE AU BURKINA FASO

par

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Abstract

In Burkina Faso, forestry research activities were started in the 1950's under the Centre Technique Forestier Tropical (now CIRAD-FORET). The main institution, the "Institut de Recherche en Biologie et Ecologie Tropicale" is mandated to coordinate forestry research activities in close collaboration with other institutions such as the "Faculté des Sciences" of the University, the "Centre National de Semences Forestières", the "Institut National d'Etudes et de Recherches Agricoles". Some significant results and important progress have been achieved, but weaknesses still remain. The strengthening of national research would require:

- (i) The building of institutions through improvement of international institutional relations and strengthening of their organizational and management capacities.
- (ii) Better management of human resources.
- (iii) Development of a National Forestry Research Programme.
- (iv) The strengthening of capacities for academic, specialized and in-service training.
- (v) Better management of scientific information and documentation.
- (vi) More effective liaison between training, research and extension.
- (vii) Development of regional and international research networks based on complementarity, not competition.

Resume

Au Burkina Faso, les activités de recherche forestière remontent aux années 1950 et plus tard sous l'impulsion du Centre Technique

Forestier Tropical, aujourd'hui CIRAD-FORET. La principale institution, l'Institut de Recherche en Biologie et Ecologie Tropicale, coordonne les activités de recherche forestière en étroite collaboration avec d'autres institutions dont la Faculté de Sciences et Techniques de l'Université, le Centre National de Sciences Forestières, et l'Institut National d'Etudes et de Recherches Agricoles. Bien que des résultats notables et des progrès importants aient été réalisés ces dernières années, il subsiste cependant certaines insuffisances. La stratégie de renforcement de la recherche nationale proposée passerait par:

- (i) le renforcement institutionnel, notamment l'amélioration des relations inter-institutionnelles, le renforcement de capacités organisationnelles et de gestion;
- (ii) une meilleure gestion des ressources humaines;
- (iii) le développement d'un programme national de Recherches Forestières;
- (iv) le renforcement des capacités de formation académique, continue et spécialisée;
- (v) une meilleure gestion de l'information scientifique et technique;
- (vi) une liaison plus effective entre la formation, la recherche et la vulgarisation bilatérale;
- (vii) et enfin le développement des réseaux régionaux et internationaux de recherche. Ces réseaux devraient être basés sur un esprit de complémentarité, et non de compétition.

INTRODUCTION

Au Burkina Faso, tout comme dans la plupart des pays de l'Afrique occidentale francophone, les administrations forestières ont été mises en place à partir de 1935. A cette époque, les efforts de la politique forestière étaient orientés vers le bois précieux de la forêt tropicale humide, exporté pour les besoins des industries européennes. Ainsi un accent a été accordé à un inventaire de ces ressources ligneuses ainsi qu'à l'étude technologique en vue de retenir les plus intéressantes pour l'exploitation.

Concernant la zone soudano-sahélienne, la recherche forestière n'a pas connu le même intérêt ni le même développement. C'était plutôt une zone considérée comme essentiellement cotonnière et pastorale. Les formations

végétales des zones sèches ne produisant pas de bois précieux exportables n'ont pas fait l'objet d'attention soutenue. Considérées plutôt comme des broussailles aux arbres tordus, ces forêts n'ont pas été gérées et aménagées à des fins de production. De même les essences locales considérées comme ayant une croissance lente n'ont pas été valorisées dans les programmes de reboisement. Seule l'exploitation de quelques sous-produits tels que la gomme a été organisée dans la région. Donc jusqu'en 1935, la recherche forestière dans les pays sahéliens et notamment au Burkina Faso était quasi-inexistante. Après les indépendances, ces pays se sont tout d'abord préoccupés à asseoir leur administration, notamment la formation des cadres nécessaire au développement. La recherche forestière ne constituait donc pas un objectif prioritaire compte tenu de la multitude des problèmes à résoudre. C'est pourquoi la politique forestière nationale a été caractérisée essentiellement par des actions de protection dans les forêts classées, les parcs nationaux et les réserves de faune avec très peu de programmes visant l'amélioration et la production forestière. Cette orientation vers la protection n'a donc pas permis de situer clairement la contribution économique pourtant très importante du secteur forestier dans l'économie nationale. Aujourd'hui, après une trentaine d'années, des cadres forestiers ont été formés au contact des réalités des populations. Il est maintenant connu et accepté que les formations végétales naturelles ne sont pas destinées simplement à assurer l'approvisionnement en bois mais qu'elles constituent pour les populations une source importante de biens et de services variée.

Cette prise de conscience sur les fonctions multiples des forêts naturelles et des essences locales a permis l'amorce et le développement d'une recherche forestière orientée vers les formations naturelles. Ainsi l'aménagement des forêts naturelles et l'utilisation des essences locales en plantation sont devenues des programmes de recherche importants dans certains pays de la région. De même le secteur forestier est considéré aujourd'hui, à juste titre, comme apportant un soutien à la production agricole en vue de l'autosuffisance alimentaire et la lutte contre la désertification. Cependant, le manque de recul et l'insuffisance des connaissances scientifiques et techniques rendent difficile la mise en oeuvre des programmes.

Au niveau international et régional, l'Union Internationale des Instituts de Recherches Forestière (IUFRO) a contribué à définir des orientations pour la recherche forestière en Afrique Nord Soudanienne, qui ont permis de générer des programmes nationaux et régionaux.

BREF BILAN-DIAGNOSTIC DE LA RECHERCHE FORESTIERE AU BURKINA FASO

Le début des activités de recherche forestière au Burkina Faso remonte aux années 1950. Cependant, c'est seulement à partir de 1963 que le Centre Technique Forestier Tropical (CTFT) aujourd'hui CIRAD-FORET, a démarré une recherche forestière organisée couvrant le Niger et le Burkina Faso. A partir de 1975, un centre CTFT autonome a été créé pour le Burkina Faso. Depuis 1989, l'Institut de Recherche en Biologie et Ecologie Tropicale (IRBET) et le CTFT ont étroitement collaboré à la mise en oeuvre de la recherche forestière au Burkina Faso.

Du côté universitaire, c'est l'Institut de Développement Rural (Faculté des sciences) qui est chargé de la formation des chercheurs, ingénieurs et techniciens. Par ailleurs le Ministère de l'Environnement et du Tourisme, dispose de certaines structures qui contribuent notablement à la mise en oeuvre de la recherche forestière telles que le Centre National de Semences Forestières, les Services de l'Aménagement Forestier, du Reboisement, de la Pêche et de la Faune.

Ainsi les efforts conjoints de ces différentes structures, coordonnés au niveau national par l'IRBET ont permis de réaliser des acquis scientifiques et techniques importants dans divers domaines tels que la sylviculture en plantation, les semences forestières, les techniques de pépinière, la sélection et l'amélioration génétique des essences locales, l'introduction et la sélection d'espèces exotiques, la technologie et la valorisation du bois, les biotechnologies, l'agroforesterie, l'aménagement des formations naturelles etc.

Cependant la recherche forestière nationale présente encore des insuffisances d'ordre institutionnel, organisationnel, législatif, technique, humain, matériel et financier.

Contraintes institutionnelles

Le Burkina Faso a affiché une volonté politique claire en ce qui concerne la recherche d'une manière générale, considérée comme moteur du développement économique. Cela se traduit par l'existence du Ministère de l'Enseignement Supérieur et de la recherche scientifique (MESRS). Au sein du MESRS fonctionne d'une part le Centre National de la Recherche Scientifique et Technologique (CNRST) dont dépend plusieurs instituts de recherche dont l'IRBET et l'INERA et d'autre part l'Université (la Faculté des Sciences). Par ailleurs certains services et directions du Ministère de l'Environnement et du Tourisme ont également développé des programmes

et activités de recherche forestière.

Les contraintes institutionnelles concernent:

- l'instabilité de certaines structures à savoir un certain flou dans leur mission et attribution;
- la faible coordination entre les instituts de recherche et de développement d'une part et entre les instituts de recherche et l'université d'autres part.

Contraintes organisationnelles et juridiques

Elles concernent notamment la faible autonomie des structures de recherche. Cette situation est partiellement liée à l'inadéquation des statuts des différents instituts par rapport au rôle qui leur est dévolu. Bien que les différentes structures aient pris conscience de la nécessité de coordonner leurs activités et d'éviter les duplications, cependant l'absence d'un programme national de recherche forestière conjointement préparé par toutes les structures concernées constitue encore une insuffisance majeure. Il en est de même de l'absence d'un mécanisme efficace de suivi et d'évaluation.

Contraintes techniques

Certains programmes n'ont pas encore de résultats significatifs notamment dans les domaines de l'aménagement des formations naturelles, l'agroforesterie, les biotechnologies, l'entomologie et la phytopathologie, etc...

Contraintes financières

La part de l'Etat au financement est encore relativement faible malgré les efforts importants déployés ces dernières années. Il en est de même pour certains projets de développement qui ne prévoient pas de composante recherche et par conséquent par de ressources financières nécessaires à la conduite des programmes de recherche forestière. Par ailleurs, l'intérêt des opérateurs économiques vis à vis de la recherche est encore faible.

Contraintes humaines

L'effectif du personnel de recherche, le niveau de formation des chercheurs et l'effectif du personnel d'appui (techniciens, secrétaire, comptable, etc...) sont encore limités comme ci-dessus.

Instituts Personnel	Université	IRBET	CNSF	Autres	Total
PhD	15	6	4	8	33
MSc	5	19	15	14	53
Techniciens	5	5	10	25	45
Personnel d'appui	10	9	16	6	41
Total	35	39	45	53	172

STRATEGIE DE RENFORCEMENT DE LA RECHERCHE FORESTIERE NATIONALE AU BURKINA FASO

Au niveau national

Renforcement institutionnel

A. Améliorer les relations inter-institutionnelles

Pour permettre aux structures de recherche d'être des partenaires effectifs et efficaces tant au niveau national, régional qu'international, il sera nécessaire de développer les relations internes institutionnelles. Il s'agira de préciser les rôles, statuts ainsi que les instituts spécialisés dans la Recherche-Développement, ceux du Centre National de la Recherche Scientifique et Technologique, notamment l'IRBET et l'INERA. Il s'agira en outre, d'améliorer les interactions entre ces instituts et l'Université notamment la Faculté des sciences. Enfin, les relations des structures citées ci-dessus du Ministère de l'Enseignement Supérieur et de la Recherche Scientifique et celles du Ministère de l'Environnement et du Tourisme devraient être également améliorées.

L'amélioration de ces relations inter-institutionnelles devrait permettre une bonne coordination de la recherche forestière nationale et une bonne intégration entre la formation académique, la recherche appliquée et la vulgarisation.

En outre, les mécanismes de coordination des différentes structures (conseil scientifique, conseil de gestion, conseil de perfectionnement, comité national de la recherche forestière) devraient fonctionner régulièrement et harmonieusement, des accords cadres devraient être

conclus et signés entre les principales structures concernées en précisant la répartition des tâches entre elles, afin d'éviter tout risque de duplication.

B. Améliorer les structures, leur statut et leur organisation

- Autonomie de gestion -

Il s'agira de renforcer le degré d'autonomie financière et de gestion des structures de recherche (IRBET, INERA, CNSF.) afin de les conférer plus de responsabilité dans la conduite des programmes ainsi que dans la quantité et la qualité des résultats obtenus. Un accent particulier devra être mis sur l'étude de l'autofinancement des différentes structures en dégagant les propositions pour augmenter les ressources et réduire autant que faire se peut les charges. La part de l'Etat au financement des projets prioritaires de la recherche forestière, en tant qu'appui à la production agricole et pour l'autosuffisance alimentaire devrait être progressivement augmentée de même que celle des opérateurs économiques bénéficiant des produits de la recherche.

- Statuts du personnel -

La question des statuts du personnel de la recherche attend toujours d'être résolue. Elle vise à reconnaître les chercheurs en tant que tels, (le diplôme minimal requis pour être considéré comme chercheur est actuellement le doctorat et est considéré par certain chercheur comme trop exigeant) de relever leur moral, d'orienter les recherches vers besoins prioritaires du développement, d'éviter la course effrénée vers les "diplômes faciles", de promouvoir une meilleure gestion et planification de la recherche (en encourageant les fonctions de Directeurs, Chef de division, Chef de station ou d'antenne régionale, biométricien, informaticien...). Cependant, le souci de la qualité, de l'efficacité notamment les résultats obtenus en fonction des normes internationales devraient être sauvegardés et garantis d'où la nécessité de former des chercheurs élites pour la conduite des programmes nationaux.

- Système d'évaluation -

L'évaluation des chercheurs devraient être étudiée en tenant compte des compétences professionnelles, de l'efficacité dans l'exécution des programmes notamment la quantité et la qualité des résultats publiés selon les normes internationales ainsi que les capacités en gestion des programmes de recherches c'est-à-dire la planification, l'organisation, le contrôle, le suivi, l'évaluation.

Des concertations entre chercheurs et enseignants sont nécessaires afin de tirer le meilleur profit de la recherche académique et la recherche développement, l'objectif étant de disposer de chercheurs en quantité suffisante, compétents, travaillant en quiétude bénéficiant de la formation continue et bien motivés.

- Motivation des chercheurs et du personnel de recherche -

Hormis les formes matérielles de motivation, d'autres formes devront être étudiées afin d'impulser les chercheurs au travail et accroître leur productivité. Le rôle des gestionnaires de la recherche est déterminant afin de libérer les chercheurs des pressions diverses, de créer un climat de confiance, un esprit d'équipe propice au travail.

C. Améliorer la gestion des ressources humaines

Des efforts substantiels devront être certes déployés pour permettre le recrutement de chercheurs juniors mais aussi assurer la disponibilité de chercheurs seniors en nombre suffisants pour encadrer les jeunes chercheurs. En outre, les ratio chercheurs/techniciens actuellement bas mériteraient d'être rehaussés afin de garantir la bonne exécution des programmes. En outre, le niveau du personnel administratif et d'appui mériterait également d'être relevé afin de permettre une bonne tenue des documents administratifs et de bonnes relations avec le public et les partenaires de coopération. Compte tenu des moyens limités de l'Etat et des limitations imposées par le programme d'ajustement structurel dans la plupart des PVD dont le Burkina Faso, la contribution des partenaires nationaux bilatéraux, privés, régionaux et internationaux au renforcement des effectifs et des compétences des chercheurs devra être souhaitée.

Soutien au Programme National de Recherche Forestier (PNRF)

Un programme de recherche sur l'Environnement et la forêt au Burkina Faso a été préparé en décembre 1989 par l'IRBET sur la base des recommandations du Plan d'Action Forestier Tropical, des recommandations de l'atelier IUFRO sur les priorités de recherche forestière en Afrique soudano-sahélienne. Ce programme tient compte des conclusions de l'atelier régional sur le programme sahélien de semences forestières et des préoccupations exprimées par le principal ministère utilisateur des résultats de la recherche forestière à savoir le MET. Si un tel programme constitue un acquis incontestable, il est plus que nécessaire que toutes les structures actives dans la recherche forestière préparent

conjointement un Programme National de la Recherche Forestière au Burkina Faso en tenant compte des priorités nationales et des nouveaux développements de la foresterie tant au niveau bilatéral, régional qu'international.

les programmes prioritaires en cours d'exécution tant à l'IRBET à l'INERA, à l'Université, au CNSF et dans certains services du MET sont les suivants:

A. Recherche forestière

- Sylviculture en pépinière et en plantation
- Aménagement et gestion des formations naturelles
- Biotechnologie
- Technologie du bois
- Produits non-ligneux
- Semences forestières et amélioration génétique
- Agro-foresterie

B. Recherche botanique/biologie

- Inventaire floristique
- Ethnobotanique
- Distribution, phytogéographie et cartographie
- Biologie et phénologie.

C. Recherche en écologie/environnement

- Suivi de la dynamique des écosystèmes et de l'environnement
- Aménagement de la faune et zoologie (mammalogie, entomologie, phytopathologie, ornithologie, herpétologie...)
- Hydrobiologie/ressources halieutiques.

Formation académique, continue et spécialisation

La formation universitaire et post-universitaire est du ressort de la faculté des sciences notamment de l'ex-IDR qui est la garante de la qualité des chercheurs et des techniciens en relation avec les autres structures de recherches et de développement.

L'université de Ouagadougou entretient des relations de coopération avec d'autres universités africaines dans le cadre du Conseil Africain et Malgache de l'Enseignement Supérieur (CAMES) et de l'Association des Universités en langues française (AUPELF). En outre, des accords de coopération sont signés avec plusieurs universités européennes, américaines, nord américaines. Des programmes de formation post-

universitaire conjoints et adaptés aux préoccupations du chercheur, selon la "formule sandwich" devront être déployés en vue de renforcer le programme de Doctorat de la Faculté des sciences notamment en financements nouveaux, en laboratoire, en équipement et en ressources humaines complémentaires.

La formation continue des chercheurs est également du ressort et des instituts de recherche en relation avec les structures de développement. Elle devrait consister en l'organisation de séminaires nationaux et régionaux de courte durée, des ateliers spécialisés, des cours de perfectionnement, des voyages d'études dans d'autres pays. De telles rencontres devraient favoriser la participation des chercheurs ainsi que la présentation des méthodologies de leurs recherches et des résultats obtenus. Des sujets spécifiques et importants tels que la rédaction scientifique et la publication des résultats de la recherche devront être abordés.

La formation des gestionnaires et planificateurs de la recherche est également un aspect important de la recherche forestière nationale. En effet, les structures de recherche ne souffrent pas seulement de l'insuffisance des moyens matériels et financiers mais aussi des capacités limitées des responsables en gestion de la recherche à savoir la planification, l'organisation, l'impulsion des chercheurs, le suivi et l'évaluation des organisations régionales et internationales telles que le CILSS, la FAO, l'ISNAR ainsi que d'autres organismes bilatéraux devraient poursuivre les efforts déployés dans cette direction.

En conclusion, il sera nécessaire de préparer pour la recherche forestière nationale, un plan global de formation pour satisfaire les préoccupations et les besoins à tous les niveaux.

Gestion de l'Information scientifique et technique

Les efforts à déployer dans ce domaine devraient concerner d'une part l'assistance à la conception et la mise en oeuvre d'une politique de publication régulière et soutenue des résultats de la recherche notamment un service de publication, l'accès aux réseaux d'information scientifique existants tels que le réseau sahélien de documentation de l'Institut du Sahel/CILSS (RESADOC), AGRIS de la FAO, CABI, etc... Cela nécessitera donc le renforcement de bibliothèques dotés de moyens informatiques, de base de données ainsi que des ressources pour l'acquisition d'ouvrages scientifiques de base et, l'abonnement aux revues scientifiques. La coopération régionale et internationale devrait être largement mise en contribution pour satisfaire ces besoins importants.

Liaison Formation - Recherche - Vulgarisation

Renforcer les liens entre la formation universitaire et post-universitaire, la recherche et la vulgarisation constitue une des clés de réussite du Programme National de la Recherche Forestière au Burkina Faso. Il s'agira d'encourager et de faciliter la participation des enseignants chercheurs aux programmes des instituts de recherche-développement et inversement et à mettre en place des mécanismes permettant une présence plus soutenue des chercheurs sur le terrain de la vulgarisation ainsi que leur contribution effective à la formation du personnel de vulgarisation. En outre, les mécanismes de transfert des résultats obtenus, des technologies mises au point ainsi que le "feed back" devrait être sérieusement étudiés et régulièrement évalués. A ce titre, le Comité national de la recherche forestière ainsi que d'autres cadres de concertation nationale et pluridisciplinaire mériteraient d'être régulièrement organisés. Des groupes de travail nationaux de recherche forestière s'avèrent également nécessaires.

Coopération régionale

Le Burkina Faso, tout comme les autres pays de la région accorde une attention particulière à la coopération régionale. L'Institut du Sahel (INSAH) est l'institut spécialisé du Comité Permanent Inter Etats de Lutte contre la Sécheresse dans le Sahel (CILSS). Les options stratégiques de l'INSAH concernent le renforcement des systèmes nationaux de recherche agricole des Etats membres du CILSS, le renforcement des fonctions de coordination de la recherche de l'INSAH, et l'amélioration de la qualité et la quantité de l'information scientifique et technique. L'INSAH assure au bénéfice des Etats et en collaboration avec des partenaires africains et internationaux les tâches suivantes:

- * collecte, analyse et diffusion des résultats de la recherche scientifique et technique
- * transfert et adaptation des technologies
- * promotion, harmonisation et coordination de la recherche scientifique et technique
- * formation des chercheurs et techniciens
- * réflexion et définition des thèmes régionaux prioritaires de recherche
- * planification de la recherche au plan régional.

A ce titre, l'INSAH est actif dans l'identification, l'organisation, la mise en oeuvre et l'évaluation des réseaux régionaux de recherche forestière.

La nécessité et l'importance des réseaux régionaux

La plupart des réseaux de recherche forestière sont fondés sur le fait que les problèmes auxquels fait face la recherche forestière nationale dépassent de loin les limites des priorités nationales ainsi que les ressources financières, matérielles et humaines d'un seul institut normal de recherche forestière qui de plus nécessitent une approche pluridisciplinaire. C'est pourquoi les réseaux régionaux de recherche ouvrent aux Etats des portes d'énormes possibilités difficiles à ouvrir au niveau national. Cependant, un des facteurs de réussite de ces réseaux est l'existence d'instituts de recherche suffisamment forts, que des chercheurs et des moyens appropriés pour jouer le rôle de leader dans certains domaines spécifiques. Ainsi la plupart des réseaux de recherches au Burkina Faso vise: le renforcement des capacités nationales de recherche, la mise en place de ces réseaux passe par l'identification de priorités nationales et régionales de recherche, la recherche et la mobilisation des financements et des ressources, la formation des chercheurs et des techniciens, la dissémination de l'information scientifique, du matériel végétal et animal, la liaison avec d'autres réseaux régionaux et internationaux de recherche.

Le programme spécial pour les pays en voie de développement de l'IUFRO a largement contribué dans ce sens à travers un atelier régional regroupant 16 pays dont le Burkina Faso pour la planification de la recherche forestière en Afrique nord-soudanienne. De cette large consultation sont ressorties les priorités suivantes:

- semences forestières et amélioration génétique
- agroforesterie
- aménagement des formations naturelles
- biotechnologies

Actuellement, deux des 4 priorités ont été concrétisés dans les pays du Sahel à travers les réseaux régionaux suivant:

- * IUFRO/FAO/CILSS: Programme Sahélien de Semences Forestières regroupant tous les neuf Etats membres du CILSS (en cours depuis 1989)
- * avec l'assistance du projet FAO - GCP/RAF/234/FRA: Programme sous-régional de mise en valeur des ressources génétiques des ligneux à usages multiples (1989-1993)

D'autres réseaux régionaux sont également en cours de préparation ou

d'exécution, il s'agit de:

- * ICRAF/SALWA/INSAH: réseaux sur l'arboforesterie regroupant 4 pays en Afrique de l'Ouest. (Burkina Faso, Mali, Niger et Sénégal)
- * FAO/CILSS: Programme sous-régional d'aménagement et de gestion des formations naturelles (en cours de préparation)
- * FAO/CILSS: Programme sous-régional de coordination des plans d'actions forestiers nationaux (en cours de préparation)
- * UNESCO/CILSS-INSAH/BM2: Projet 507/RAF/42- Renforcement des capacités scientifiques des pays du Sahel dans le domaine agro-sylvopastoral (1989-1992-1ère phase)

Par ailleurs, certains réseaux plus souples ont été mis en place en collaboration avec des partenaires internationaux notamment européens; il s'agit de:

- * CEE/STD3: "Faidherlia albida" regroupant 2 instituts africains et 1 institut européen
- * CEE/STD3: "Parkia biglobosa" regroupant 2 instituts africains et 3 instituts européens
- * CORAF: Conférence des responsables de recherche africains et français avec des réseaux sur l'amélioration génétique et l'agroforesterie
- * OSS: Observatoire du Sahel et du Sahara avec des réseaux sur la dynamique des écosystèmes, la conservation des ressources génétiques etc...

Enfin, il convient de citer d'autres réseaux régionaux qui bien qu'ayant un but de développement, apporte dans une certaine mesure une contribution à la recherche forestière au niveau du CILSS et notamment au Burkina Faso, à savoir:

- * CILSS/CEE: Programme régional d'énergie domestique (gaz)
- * CILSS/CEE: Programme de suivi et aménagement de la gestion de l'environnement (PSAGE)

La coordination entre les réseaux

Compte tenu du nombre de réseaux, de leur nécessité et leur importance pour le renforcement de la recherche forestière une coordination est par conséquent nécessaire. Cette coordination pourrait être assurée au niveau régional INSAH/CILSS.

Coopération internationale

A travers les réseaux régionaux, les actions des organisations et instituts internationaux a été partiellement mises en évidence. Au Burkina Faso, plusieurs organisations et organismes internationaux collaborent au renforcement de la recherche forestière: il s'agit, entre autres, de l'IUFRO, la FAO, l'UNESCO, l'UNEP, l'ICRAF, l'ICRISAT, l'IBPGR, l'ITTA et l'IUCN.

Au niveau international les mots clés devraient être complémentarité et non pas compétitivité. Au Burkina Faso en particulier l'impact des Instituts et Centres internationaux de recherche pourrait être davantage significatif sous les conditions suivantes:

- * une plus grande priorité aux PVD et en particulier aux zones sèches
- * les priorités des centres et instituts internationaux au niveau régional devraient refléter les priorités des instituts nationaux de recherche forestière; il s'agira alors aux instituts internationaux d'aider les instituts nationaux dans leur tâche
- * au niveau régional, les instituts ou centres internationaux devraient collaborer étroitement avec les organisations régionales et sous-régionales existantes en cherchant les voies et moyens pour les renforcer davantage
- * un rôle important des instituts et centres internationaux pourrait concerner l'assistance à l'élaboration de méthodologies et améliorées et harmonisées au plan régional
- * la mise en oeuvre des recherches appliquées devraient se faire dans les pays par les instituts nationaux avec l'appui technique des instituts internationaux. Cependant les instituts et centres internationaux devraient développer des efforts pour la conduite de recherches stratégiques difficiles à mettre en oeuvre au niveau des pays en raison des contraintes diverses
- * la politique de création et de développement des laboratoires dans les centres internationaux devrait tenir compte des possibilités existantes au niveau national et régional en cherchant à les renforcer davantage. Certaines recherches stratégiques à dimension régionale pourraient être sous contractées à certains instituts nationaux des PVD en collaboration avec d'autres instituts des P.D. dans des centres d'excellence, leader dans certains domaines spécifique ou base-centre;
- * leur contribution à la formation des chercheurs et techniciens serait significative surtout en raison des compétences dans les PVD. Il s'agira d'apporter une assistance aux pays et aux structures régionales dans la

conception et la production de matériel didactique. Cependant, là où des compétences existent, il s'agira de les identifier, les reconnaître et les utiliser pour organiser, accueillir, et animer ces formations;

- * leur contribution à la mobilisation de financements nouveaux pour les instituts nationaux serait plus grande si la principale cible visée est les Instituts nationaux et notamment ceux des pays les plus pauvres, confrontés aux problèmes de survie et de la crise écologique.

CONCLUSION

Au Burkina Faso, renforcer la recherche est une question importante à résoudre; hormis le renforcement institutionnel il est nécessaire de se concentrer sur la préparation d'un programme national de recherche forestière (PNRF) conjointement par toutes les structures concernées. La formation des ressources humaine demeure la clé de réussite de même que la liaison entre la formation, la recherche et le développement. Des efforts importants devraient être déployés en matière de gestion de l'information scientifique et technique. La coopération régionale et internationale est nécessaire pour suppléer les efforts nationaux à travers la mise en place et la coordination de réseaux de recherche forestière.

RENFORCEMENT DE LA RECHERCHE FORESTIERE AU MAROC

par

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Abstract

The creation of the Forestry Research Station of Morocco dates back to 1934. However, this station started to be operational only in 1945, when a law defining its mission, attributions and financing procedure was promulgated. Since then, the main research activities undertaken for periods of ten and five years (national plans for economic and social

development) have been focussed on forest sites and on cultural techniques of the principal productive species: *Quercus suber*, *Cedrus atlantica*, *Pinus sp.*, *Eucalyptus sp.*, etc... Presently the Forest Research Station is a division inside the Moroccan Forest Administration which is a part the Ministry of Agriculture. Its scientific and technical staff consists of 33 researchers, 21 of which have a Master or a Doctorate degree and 12 have a bachelor degree, and 22 technicians. The research programs are mainly funded by 10% of the national forest returns.

Since 1989, the station has been organised into six departments: (1) silviculture and soil sciences; (2) plant breeding; (3) forest and wood technology; (4) forest pathology; (5) wildlife science; (6) forestry in arid regions (Marrakech). The research strategy is based on programs defined for each principal species. Five programs by a major species and one program on ecology and biodiversity will be carried out in the next five-year plan: 1993-1997.

Resume

La Station de Recherches Forestières du Maroc, créée en 1934, fonctionne réellement depuis 1945 suivant un Arrêté qui fixe sa mission, ses attributions et les modalités de son fonctionnement et de son financement. La recherche a évolué dans le cadre de trois plans décennaux 1950-59; 1960-69; 1970-79, puis dans le cadre des plans quinquennaux de développement économique et social du pays. Depuis sa création la recherche a focalisé son activité principale sur la connaissance du milieu forestier et sur les techniques de culture des principales espèces productives: *Quercus suber*, *Cedrus atlantica*, *Pinus sp.*, *Eucalyptus sp.*, etc... La Station de Recherche Forestière relève de la Direction des Eaux et Forêts et de la Conservation des Sols du Ministère de l'Agriculture et de la Réforme Agraire. Son personnel comprend 21 ingénieurs de conception, 12 ingénieurs d'application et 22 techniciens. Elle a un budget propre alimenté principalement par 10% des recettes de Fonds Forestier National.

La restructuration et le renforcement de la recherche

forestière, dès 1989, a conduit à l'organisation de la SRF en 6 unités: (1) sylviculture et sciences du sol; (2) amélioration génétique; (3) technologie forestière; (4) pathologie forestière; (5) flore et faune sauvage; (6) centre de recherche de Marrakech orienté sur la foresterie en zone aride. La stratégie de la recherche est basée sur la notion de programmes dont la finalité est de traduire en terme d'actions de recherche les objectifs techniques et socio-économiques du développement forestier. Cinq programmes présentés de manière prioritaire par espèce majeure et un programme relatif à l'écologie et biodiversité sont élaborées pour le plan quinquennal 1993-1997.

INTRODUCTION

La mise en valeur d'un domaine boisé de plus de huit millions d'ha. de forêts et de nappes alfatières est naturellement une tâche qui ne va pas sans poser de nombreux problèmes d'ordre technique dont la solution requiert souvent des études documentées, approfondies et suivies que seules des équipes spécialisées, dotées de moyens nécessaires et capables d'assurer la continuité des observations, peuvent mener à bien. C'est donc à la fois pour assumer la charge de l'étude des problèmes fondamentaux et pour répondre aux besoins techniques et pratiques des gestionnaires de la forêt, que fut décidée la création d'un organisme de recherches forestières au niveau national, en 1934: la Station de Recherches Forestières (SRF).

La recherche a évolué dans le cadre de trois programmes décennaux 1950-1959; 1960-1969 et 1970-1979 après quoi le programme coïncide plutôt avec les plans de développement économique et social. Les travaux réalisés se caractérisent à la fois par des aspects fondamentaux et pratiques. Ils ont permis une meilleure connaissance des milieux forestiers et du matériel végétal ainsi que les techniques culturales des principales espèces productives: *cèdre*, *chêne-liège*, *eucalyptus*, *pins* et *peupliers*. Une partie importante des résultats a fait l'objet de publications à travers les "Annales de recherches forestières" dont 25 volumes annuels ont été largement diffusés dans les services forestiers ainsi qu'auprès des institutions scientifiques, universitaires et forestières au Maroc et à l'étranger.

Depuis sa création la recherche a focalisé son activité principale sur la connaissance du milieu forestier et du matériel ainsi que sur les techniques culturales des principales espèces productives: *cèdre*, *chêne-liège*, *pins*,

eucalyptus, etc... Mais, malgré l'importance et la diversité des forêts, la connaissance de leur écologie et l'aménagement de leurs ressources restent fort limités. En effet, la recherche s'est confrontée à de nombreuses contraintes en rapport, particulièrement, avec la faiblesse du potentiel scientifique et technique au regard des programmes engagés et surtout de la diversité des besoins du pays. C'est ainsi qu'un programme de renforcement de la recherche a démarré en 1989.

Après avoir défini l'évolution et les orientations de la recherche dans le cadre de son renforcement, le rapport présente la mission et les attributions de la SRF ainsi que le cadre d'activité de la recherche.

EVOLUTION ET ORIENTATION DE LA RECHERCHE

Dès l'année 1989, en prévision d'un programme de restructuration générale de l'Administration forestière, une réorganisation de la SRF fut engagée. Ainsi, un projet de programme de recherche fut élaboré et orienté pour tenir compte des besoins du développement forestier. Le système de fonctionnement de la recherche est basé sur la notion de programme dont la finalité est de traduire en terme d'actions de recherche - ou opérations - les objectifs techniques ou socio-économiques retenus. Les programmes proposés durant les exercices 1990-1991, compte tenu de la diversité thématique induite par la diversité des objectifs, liée à celles des missions de la DEFCS sont: (1) sylviculture et milieu; (2) amélioration génétique; (3) exploitation et technologie des produits forestiers; (4) phytosanitaire; (5) écologie terrestre (flore et faune sauvage); (6) foresterie en zone aride. Chaque programme recouvre un objectif général, des objectifs spécifiques et des thématiques scientifiques qui sont traduites en action de recherche. Les programmes de recherche sont mis en oeuvre par les unités regroupant chacune l'ensemble des chercheurs intervenants dans un ou plusieurs programmes.

Dans le cadre du projet FAO/TCP/MOR 0052 (A). "Restructuration de l'Administration forestière au Maroc" la recherche forestière a bénéficié, en 1991, de l'assistance de deux consultants internationaux appuyés par un groupe de travail national qui ont proposé une planification de la recherche forestière conduisant à:

- i la clarification des missions de la recherche
- ii la formulation des objectifs en rapport avec la politique forestière
- iii la formulation d'une stratégie et d'un plan d'action
- iv la mise en place de la structure pour sa mise en oeuvre et du

système de contrôle et suivi.

Le plan d'action élaboré repose sur les éléments suivants:

- i Le renforcement de la structure chargée de la recherche forestière en vue de disposer d'une entité opérationnelle, futur Centre National de la Recherche Forestière (CNRF),
- ii la création d'un comité d'orientation et de coordination de la recherche,
- iii la mise en place, à terme, d'un comité scientifique,
- iv l'élaboration d'une programmation, présentée de manière prioritaire par espèce majeure, en y associant quelques approches par disciplines scientifiques ou par écosystème, pour des périodes de 5 ans,
- v le développement des liaisons permanentes entre la recherche et le terrain à travers des structures d'appui régionalisées,
- vi le développement d'une unité documentation au sein de la structure actuelle chargée de la recherche forestière,
- vii la mobilisation des appuis pouvant être offerts par la coopération internationale,
- viii la mise en place, à terme, d'un statut propre aux personnels de la recherche forestière.

Pour la mise en place de ces recommandations, dans le cadre du futur plan 1993-1997 de développement économique et social du pays, notamment la seconde et la quatrième qui semblent prioritaires, des groupes de travail ont été constitués dès le mois de février 1992: (i) le groupe "Comité d'orientation et de coordination de la recherche" pour l'élaboration d'un projet de texte de ce comité; (ii) les groupes "espèces": *chêne-liège, cèdre, pins, arganier, eucalyptus, écologie terrestre et biodiversité*; pour l'élaboration du programme de recherche sur 5 ans suivant un schéma inspiré de la méthode du programmation par objectifs utilisés par l'ISNAR.

Cependant, en attendant l'élaboration des documents programmes pour chacune des espèces retenues comme prioritaires, la SRF, a opéré une refonte de son programme d'activité 1992 pour l'adapter à une programmation présentée par espèces pour les espèces citées ci-dessus en y associant un programme par discipline: "Ecologie terrestre et biodiversité" et un autre programme par écosystème: "Foresterie en zone aride". Les programmes proposés comprennent chacun les opérations de recherches mises en oeuvre à la SRF, ou en collaboration avec d'autres institutions, en

rapport avec les moyens humains et scientifiques de celle-ci. Chaque programme est coordonné par un chercheur, en général, le chef d'une unité de recherche. Les opérations sont conduites par les unités de recherches correspondantes sous la responsabilité du chercheur spécialisé de l'unité. Cette présentation du programme permettra au cours de l'exercice 1992, aux chercheurs de se familiariser avec cette conception de la programmation de la recherche et suscitera une meilleure intégration des actions ainsi qu'une optimisation des moyens.

MISSION ET ATTRIBUTIONS

Créée depuis 1934, la Station de Recherches Forestières (SRF) fonctionne réellement depuis 1945. *L'arrêté viziriel du 3 Rabia II 1368 (2 Février 1949)*, relatif à son fonctionnement la dota d'un statut et en même temps de moyens indispensables en personnel et en matériel au moment où le Fonds National Forestier (FNF) reçoit la forme qui permet l'essor du reboisement au Maroc. Cet arrêté lui attribue la mission principale de procéder à toutes les études et recherches théoriques, expérimentales et pratiques concernant les forêts marocaines (art. 1er).

Les attributions de la SRF sont définies suivant les axes principaux d'orientation de ses activités suivants: (art. 2)

- 1 Ecologie forestière: météorologie, pédologie, phytosociologie, pathologie et entomologie appliquées aux principaux massifs forestiers et aux nappes alfatières.
- 2 Physiologie des essences forestières: régime et modes de traitement sylvicole à leur appliquer, la sélection des races forestières locales.
- 3 Reboisement et la conservation des sols forestiers: acclimatation d'essences forestières exotiques, amélioration des pâturages forestiers, création et gestion d'arboreta.
- 4 Technologie forestière: étude des qualités physiques, mécaniques et chimiques du bois, liège, écorces et produits divers provenant de l'exploitation forestière ou alfatière.
- 5 Protection de la nature: axe nouveau mis en place depuis 1989 dans le cadre de la restructuration de la recherche pour la promotion d'études et de recherches sur la flore, la faune et la conservation des ressources phylogénétiques et la protection de la nature.

Le programme de travail, proposé par le Directeur de la SRF, est réalisé par tranches décennales fixées "*ne varietur*" au début de chacune d'elles, par

le chef de l'Administration après avis d'un comité consultatif de la recherche, institué à cet effet.

Cet Arrêté est en cours de modification suite aux recommandations du projet FAO/TCP/MOR 0052 pour ériger la SRF en Centre National de Recherche Forestière (CNRF) et pour la création d'un comité d'orientation et de coordination de la recherche.

CADRE D'ACTIVITE DE LA RECHERCHE FORESTIERE

Organisation administrative

La restructuration de la SRF, dans le cadre général du renforcement en cours de l'Administration forestière a conduit à l'organisation de la SRF en unités de recherches fonctionnelles ou "services". Chaque service regroupe l'ensemble des chercheurs appartenant à une même discipline. Il constitue une structure souple permettant une collaboration interdisciplinaire et interinstitutionnelle et pouvant aboutir, dans certains cas, à la mise en commun des ressources matérielles et à des possibilités de formation.

La SRF comprend six services dont cinq au niveau central: (1) sylviculture et sciences du sol; (2) amélioration génétique; (3) technologie forestière; (4) pathologie forestière; (5) flore et faune sauvage et un, au niveau régional, représenté par le centre de recherche de Marrakech.

La fonction essentielle du service consiste à:

- i Elaborer et réaliser des programmes de recherche,
- ii veiller à la rigueur méthodologique des protocoles expérimentaux, à l'évaluation des résultats au regard de leurs qualités scientifiques,
- iii publier les résultats et suivre le progrès des chercheurs dans leur discipline,
- iv promouvoir la diffusion des résultats de recherche auprès des organismes de développement.

Le service s'identifie à un ou plusieurs programmes de recherches; il comprend des sections correspondant chacune à un sous-programme. Les activités de recherche sont élaborées et exécutées, depuis 1990, dans le cadre de ces unités. Leur évaluation se fait de manière régulière par des réunions périodiques, par des rapports d'activité annuels et par la publication des Annales de la Recherche Forestière et la diffusion de notes techniques.

Moyens techniques et humains

Infrastructures de recherche

La recherche forestière dispose d'un patrimoine de recherche non négligeable. Elle dispose d'un complexe de bâtiments et de laboratoires fonctionnels et équipés: (laboratoire d'analyse des sols, laboratoire de biologie végétale orienté vers les symbioses racinaires, laboratoire de technologie du bois et des produits forestiers). Elle gère à l'échelle nationale:

- i Un réseau expérimental de 150 places d'expériences et de 30 arboreta,
- ii un réseau climatologique de l'ordre de 350 stations pour les besoins de la météorologie nationale et pour ceux de l'Administration Forestière,
- iii un centre de populiculture pour la sélection et la diffusion des clones de peupliers dans le secteur agricole.

Financement de la recherche

La recherche forestière doit sa pérennité et son développement au type de financement propre dont elle bénéficie depuis sa création. Son budget est alimenté par les recettes en provenance de plusieurs origines:

- i 10% des recettes annuelles du Fonds National Forestier selon les dispositions de l'article 4 du décret du 14 novembre 1949 modifié par le décret n°2.85.892 du 18 Rabia II 1406 (31 décembre 1985) fixant les modalités d'exécution des dépenses du Compte Spécial 35-16 intitulé "Fonds National Forestier",
- ii un crédit annuel sur le budget de l'Etat (titre II: Investissement) de l'ordre de 15 à 20% du budget total de la SRF.

Cadres et personnel d'exécution des programmes

Les ressources humaines engagées dans la recherche forestière se traduisent par un effectif de 270 comprenant le personnel chercheur (cadres et techniciens); (56), le personnel administratif; (50) et le personnel d'exécution et de service; (167). Le tableau ci-après donne la ventilation du personnel technique chercheur par unité de recherche.

Coopération

Sur le plan de la coopération l'accent est mis sur le développement des

PERSONNEL TECHNIQUE CHERCHEUR				
UNITE DE RECHERCHE	INGENIEUR (CHERCHEUR)	INGENIEUR (ASSISTANT)	TECHNICIEN	TOTAL
SILVICULTURE ET SCIENCES DU SOL	4	2	8	14
AMELIORATION GENETIQUE DES ARBRES FORESTIERS	2	2	3	7
PATHOLOGIE FORESTIERE	2	4	2	8
TECHNOLOGIE FORESTIERE	4	-	-	4
ECOLOGIE TERRESTRE FLORE ET FAUNE SAUVAGE	3	-	-	3
CLIMATOLOGIE-EROSION	1	-	4	5
LABORATOIRE D'ANALYSE	1	3	1	5
STATION DE MARRAKECH	3	1	3	7
BIOMETRIE ET DOCUMENTATION	1	1	1	3
TOTAL	21	13	22	56

conventions de collaboration avec des institutions nationales: IAV Hassan II, ENFI, Facultés de Marrakech, de Tétouan, de Rabat, Institut scientifique et internationales CRDI, GTZ, etc... sur des thèmes d'études et de recherches en rapport avec les programmes de la SRF. Dans le même sens un courant "services extérieurs-recherche" se développe progressivement en raison des appuis techniques que les chercheurs apportent à ces derniers dans les domaines des dépérissements, des pépinières et de l'exploitation.

CONCLUSION

La recherche devrait constituer, dans l'état actuel des orientations de la politique forestière, un maillon indispensable et un préalable à l'efficacité des actions visant la production, la conservation, la valorisation et l'utilisation des arbres et de la forêt. La réorganisation et le renforcement

de la recherche s'imposent pour que les voies et les moyens à mettre en oeuvre puissent garantir le développement d'une recherche nationale sur des bases assorties d'une formulation judicieuse des objectifs et des programmes, des possibilités d'évaluation et de transfert des résultats.

La stratégie et le programme à long terme proposés devrait constituer un cadre général dans lequel s'encarte l'ensemble des activités de recherches forestières nationales de la SRF, des Facultés, des établissements de formation supérieure voire d'autres organismes. Elle suppose la connaissance très précise des activités de recherches, des travaux réels et des compétences de chaque ingénieur et technicien.

Néanmoins, la faiblesse du potentiel scientifique et technique de la SRF, tant sur le plan quantitatif et qualitatif, les difficultés de recrutement des cadres spécialisés et d'affectation de cadres et de techniciens forestiers expérimentés et motivés, l'insuffisance, à l'état actuel des choses, de coordination inter-institution et avec les services utilisateurs, sont autant d'obstacles qu'il faut surmonter pour conduire de manière efficace les recherches en cours et celles projetées durant la période 1992-2000.

La réorganisation et le renforcement de la SRF pour la mise en place du plan d'action devrait créer les conditions d'un épanouissement et d'une plus grande efficacité des chercheurs en place en raison: (i) d'une moindre dispersion professionnelle et scientifique due à la concentration des objectifs de recherche; (ii) à une plus grande responsabilité et motivation dans la conduite du programme.

Néanmoins, des efforts doivent être consentis pour la formation permanente qui demeurent indispensable pour améliorer le niveau scientifique des chercheurs et la qualité des recherches et de leurs résultats (séminaires, missions ou stages de courte et moyenne durée à l'étranger, mission d'appui de spécialistes étrangers, etc...). Il restait enfin à définir un cadre statutaire du chercheur forestier, dans le cadre général du "statut du chercheur", propre à attirer un nombre suffisant de cadres et à conditionner leur stabilité et la continuité de la recherche.

STRENGTHENING OF FORESTRY RESEARCH IN BRAZIL

by

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Abstract

Forestry research in Brazil is directed mainly towards plantation species, which are currently the main raw material base for the more vigorous segments of the Brazilian forest products industry. Although research with plantation species should continue and be encouraged, research dealing with management and utilization of native tropical forests should receive higher priority.

Introduction

With more than 40% of its territory covered by forests and with large areas with good potential for growing trees, Brazil is a country where forestry should play a very significant role in its social and economic development.

However, despite the fact that about 40 million hectares of tropical forests have been cleared during the last four decades, the contribution from the vanished forests to the national economy has been nil. On the contrary, by destroying this resource Brazil has become a villain in the eyes of the international community, with unfavorable consequences to its international trade of forest products, even those coming from plantations.

There are many reasons for the poor utilization of the tropical forest resource. Certainly one of them is the lack of adequate knowledge about how to manage it properly and how to produce valuable goods that will pay for such management. Strengthening the national forestry research capacity can be a very efficient way to obtain this knowledge.

Forestry research in Brazil

Although the early settlers learned to use the great variety of species found in the colony, they were never concerned with replenishing the forest resource. The Portuguese, as well as later immigrants such as the Italians and the Spaniards, were used to build with stones and bricks and not with wood. For this reason, wood was never used in Brazil to its full potential as building material. Therefore, forest land was regarded as a stock of

agricultural land and not as a source of materials and goods, nor as an important element for the protection of the environment.

In Brazil, the first higher education institutions, such as law and medical schools, were established by the turn of this century; however, the first forestry school started its activities only in the early 60's, as part of an FAO project. That is the main reason why forestry research is quite new in Brazil, although professionals from related areas, such as agronomists, have been engaged in managing industrial plantations since after World War II. Today there are 14 forestry schools in the country, with about two hundred graduates every year.

Today forest research is carried out mainly by the Empresa Brasileira de Pesquisas Agropecuárias - EMBRAPA (Brazilian Corporation for Agricultural and Cattle-breeding Research), which was established in 1973 within the Ministry of Agriculture. A national center, Centro Nacional de Pesquisas Florestais - CNPF, was established in 1984 in Colombo, near Curitiba, with the specific objective of coordinating research projects in forestry.

Today, CNPF looks after some 130 research projects throughout the country. The main areas are: genetic improvement, phytopathology, seed production, soils and plant nutrition, wood anatomy and wood quality, and ecology. In the last decade CNPF has produced about three tons of improved seeds of various species of *Eucalyptus*, to plant 400 thousand hectares in 13 states. Other species are also being studied: *Araucaria angustifolia*, *Mimosa scabrella*, *Pinus* and *Acacia spp.*

In the Amazon region forestry research is mainly carried out by the Instituto Nacional de Pesquisas da Amazonia - INPA (National Institute for Amazon Research) and by the Superintendência do Desenvolvimento da Amazonia - SUDAM (Amazon Development Authority); INPA is located in Manaus and SUDAM in Belém. Both institutions are involved with silviculture and products research. In 1980 INPA established a large forest products laboratory, with modern facilities and equipment, aimed at the utilization of Amazon woods; the official name of this center is Centro de Pesquisas em Produtos Florestais - CPPF.

Research on forest products is also carried out by Laboratório de Produtos Florestais - LPF, in Brasília, which is part of the IBAMA, the Brazilian Institute for the Environment and Renewable Natural Resources. The Division of Forest Products, Textiles and Leather - DPFTC, of the Instituto de Pesquisas Tecnológicas do Estado de São Paulo S/A - IPT, also deals with forest products research. The first study on properties of Brazilian woods was published by IPT in 1905, describing the mechanical

behavior of 51 species.

In addition to government institutions, the universities also are involved with forestry research in Brazil. The Forestry School of the University of São Paulo, in Piracicaba, the Federal University of Paraná, the University of Viçosa, Minas Gerais, and the Federal University of Rio de Janeiro are the most active.

The fact that these universities are located in Southern Brazil, where there are a number of successful forest products companies using plantation wood as their raw material, led to highly efficient cooperation between them and the private sector with the objective of developing joint research projects. Such cooperation is materialized through private organizations made up of representatives of both sides. In Piracicaba it is IPEF - Instituto de Pesquisas e Estudos Florestais (Institute for Forest Studies and Research); In Curitiba it is FUPEF - Fundação para Pesquisas e Estudos Florestais (Forest Studies and Research Foundation), and in Viçosa it is SIF - Sociedade de Investigações Florestais (Forestry Research Society). While the university makes its staff available to the industry, the entrepreneurs provide operational funds and the sites for experimentation.

The fact that almost 90% of the value of all forest products exports from Brazil comes from industries that use plantation wood as their raw material is a good indication that this type of cooperation between industry and university is giving good results.

Obstacles to be overcome

One of the main problems with forestry research in developing countries, Brazil included, is the poor career prospects offered to young scientists by the official research organizations. Moreover, the low salaries and the constant shortage of operational funds are strong factors against motivation.

Another source of frustration for the young scientists in many developing countries is the frequent changes of leadership in research units, as a result of changes in top management. Very often the research institutions lack long range planning of its activities, so that research priorities oscillate according to the personal views of the officer in charge.

Last but not least, usually the researchers in a developing country do not have access to up-to-date technical information, nor the financial resources to take part in conferences, meetings, and other events that may keep them abreast of new developments in their fields of specialization.

Conclusion

While a program aiming at strengthening the Brazilian institutions that carry out forestry research will, no doubt, bring positive results to all of them, the first priority should go to those dealing primarily with management and utilization of native tropical forests. It is in this area that vast financial resources were pledged to Brazil as a result of the UNCED Conference held in Rio last June. However, without strong institutions we will not be able to develop good projects, no matter how much money we have available to spend.

STRENGTHENING OF FORESTRY RESEARCH IN PAKISTAN

by
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Abstract

Forestry research in Pakistan is carried out by two federal government organizations: the Pakistan Forest Institute (PKI) and Pakistan Agricultural Research Council (PARC), and several provincial research organizations. Research is directed towards supporting the aims of the newly adopted Forest Policy, the National Conservation Strategy, and the Forestry Sector Master Plan.

INTRODUCTION

Pakistan has probably the least forest area in Asia in terms of percentage of land area and per capita forest area. Of a land area of 87.98 million ha, forests cover only 4.27 million ha or 4.8%. For a population of 110.76 millions the per capita forest area is only 0.04 ha. The proportion of production (commercial) forests is very small - 26.2% of the total forest area or 1.12 million ha. The biggest timber resources are the coniferous forests in the north-east, north and north-west hilly regions. These forests cover 1.93 million ha and about half are production forests. Other timber

producing forests are in the plains: 0.2 million ha of irrigated plantations and 0.3 million ha of riverine forests. The non-productive forests in the hills and plains are the scrub forests (1.3 million ha) and coastal forests (0.35 million ha) respectively.

There has been no significant extension of forest area in more than four decades. This is mainly due to low priority of the forestry sector in the national economy. The importance of forests especially for the protection of the watersheds in the hilly regions has not been generally recognized. At the same time the natural forests and plantations have been considerably depleted in growing stock over the years due to cutting for fuelwood and timber by the increasing population.

Efforts to improve the situation have been meagre, scattered and patchy. However, there have been some noteworthy exceptions. Most of the productive forests and plantations are managed through management plans prepared by the locally trained manpower. Pilot programmes of intensification of management of natural coniferous forests, irrigated plantations and riverine forests have been started. Promotion of tree growth on farmlands in some localities has been successfully carried out through farm forestry programmes by the foresters and research scientists.

DEVELOPMENT OF FORESTRY RESEARCH IN PAKISTAN

Forestry research in Pakistan is conducted at federal and provincial levels. The institutions involved are as follows:

FEDERAL INSTITUTIONS

Pakistan Forest Institute (PFI): Before the creation of Pakistan in 1947, research in forestry and forest products as well as education in these disciplines was conducted at the Forest Research Institute and Colleges, Dehra Dun, India. After the creation of Pakistan, the Pakistan Forest Institute was established. Initially its activities were confined to forestry education. Subsequently the research branches of Forest Utilization (1947), Forest Entomology (1949), Forest Botany ((1951), Forest Chemistry (1952), Medicinal Plants (1953) and Silviculture (1956) were established. In the mid-sixties the branches of Range Management, Watershed Management, Forest Mensuration and Management, Forest Economics and Forest Genetics were added, followed in the eighties by Watershed Management, Sericulture, Wood Products, Timber Harvesting and Transportation and Agroforestry.

The human resources of the PFI have been gradually built up, from one director and four branch officers in the beginning, to its present strength of 87 as follows:

PhD	10
MSc Forestry	19
MSc other subjects	29
BSc	6
Others	23
Total	87

Pakistan Agricultural Research Council (PARC): The Council is mandated to undertake, aid, promote and coordinate agricultural research in Pakistan. It has its own research facilities in the form of a National Agricultural Research Centre (NARC), and an Arid Zone Research Institute, and it undertakes such forestry, range and watershed research as is not being done by the PFI or by the provincial forestry research units. It also provides financial assistance to research institutions and universities for conduct of research in these fields.

One of aims of the NARC is to develop improved technology for rainfed areas on an integrated land use basis to increase farm productivity and stabilize income. Under this, its research activities cover range management, watershed management and farm forestry. It also promotes research in sericulture and biological nitrogen fixation. A National Forage and Fodder Research programme has been executed by PARC/NARC in collaboration with universities, and agricultural and forestry research institution for the past 10 years. One of the objectives of this programme is to introduce, test and select grasses, legumes, shrubs and important forage trees in various ecological zones of Pakistan.

The Arid Zone Research Institute at Quetta has its outreach units at Umarkot, Bahawalpur, Gilgit and D.I.Khan. It caters to the research problems of the arid zones, which occupy 72% of the country. This Institute conducts research on the propagation and planting of fodder grasses and trees.

PROVINCIAL RESEARCH ORGANIZATIONS

Punjab Forestry Research Institute, Faisalabad: The Punjab province had a Silvicultural Research Division from 1947, which was transferred to the Punjab Forestry Research Institute in 1986. This institute is responsible for

forestry research and vocational training in the Punjab province. Its research activities cover silviculture, forest management, range management, sericulture and pest control.

The Institute is under the administrative control of the Punjab Forestry, Wildlife and Fisheries Department. It is headed by a Director, who has the following research staff:

	<u>GRADE</u>	<u>NO</u>
Senior Research Officers	18	6
Research Officers	17	20
Assistant Research Officers	16	25

The Institute has well equipped laboratories in the main building, three research sub-stations and six field stations located in different ecological zones.

Forest Research Division, NWFP, Peshawar: Forestry research in NWFP is supposed to be conducted by a Divisional Forest Officer (Research) stationed at Peshawar. However, this post is rarely filled. The research problems of the province are usually referred to the Pakistan Forest Institute because of its close proximity.

Forest Research Division, Sindh, Hyderabad: The Divisional Forest Officer, Silvicultural Research Division, is responsible for forestry research in Sindh province, which is chiefly centered at its research station at Miani, near Hyderabad. The research staff, besides the Divisional Forest Officer, consists of a Research Officer/Assistant Research Officer and a few technicians. A research station of this Division is located at Mirpur Mathelo, Sukkur. The Division is currently working on the introduction of fast growing species including coconut and oil palm, development of nursery techniques, reclamation of salt-affected soils through afforestation and improvement of agroforestry practices, and use of effluent and underground water with high salt concentration. A new development project titled "Establishment of Forest Research and Training Institute, costing Rs.70.6 million is presently being processed by Sindh Government. If created, a Research Institute similar to PFRI will be established with five field stations located in different zones. It has received considerable technical and financial assistance from the PFI in the past and such assistance is expected to continue in future.

Forest Research Division, Balochistan, Quetta: This Division is concerned with research in range management, sand dune stabilization and afforestation.

Forest Research Division, AJK, Muzaffarabad: Since AJK territory is mostly mountainous, this Division is concerned with research in hill forestry including range and watershed management. It has field stations at Chattar Kalas and Chikar. Its major accomplishments include survey of medicinal plants in Keran Forest Division, and the preparation of volume tables and model working/management plans for intensive forest management in the hilly areas.

Forestry Research in Northern Areas: There is no forestry research unit per se in the Northern Areas territory. The Pakistan Agricultural Research Council has a research institute there, which is engaged in tree and range research to a limited extent. The Agha Khan Rural Support Programme is actively engaged in social and economic development of area and has a number of forestry programmes. It gets assistance in conduct of research from the PFI when necessary.

Agricultural Universities: The Agricultural University, Faisalabad started a Department of Forestry and Range Sciences in 1972 and offers some courses in forestry in association with agriculture. In their final year, the students can chose to conduct forestry research as part of their studies.

RESEARCH ACHIEVEMENTS

Some significant forestry research achievements in Pakistan are as follows:

- Training and retraining of professional and technical manpower for provincial/ regional forest departments, other government agencies and NGOs in Pakistan, and other countries in Asia and Africa
- Selection and propagation of fast growing tree species of eucalypts, poplars, Paulownia, Ipil Ipil.
- Introduction of water harvesting techniques for growing trees in dry regions
- Development of dry zone afforestation techniques for desert areas
- Control of shisham defoliator, powder post beetle, and kail defoliator
- Production and distribution of quality tree and grass seed
- Improvement of resin production from chir trees
- Preparation of volume and yield tables of all commercial tree species

- Production of disease free silk seed
- Selection and propagation of mulberry varieties for silkworm rearing
- Control of dwarf mistletoe in juniper forests of Balochistan
- Improved construction of forest roads for economic and efficient extraction of forest produce and to facilitate scientific forest management
- Utilization of poor quality woods for manufacture of panel products
- Determination of technological properties of commercial timbers to ensure their economic and efficient use
- Collection of soil loss data for watersheds and slide control in hilly regions
- Studies on economic management of forests and plantations
- Promotion of tree growth on farmlands
- Survey of tree growth on the farmlands of NWFP and Punjab.

PROSPECTS OF FORESTRY RESEARCH DEVELOPMENT

Three significant developments in Pakistan during 1991-92 will have effects on forestry and forestry research in the coming years. These are:

1. **Announcement of Forest Policy:** Announced by the Federal Government in May 1991, this policy aims at doubling the forest area in the next 15 years. In order to achieve this goal it proposes the following measures for development of forestry research:

- a. Develop and strengthen research programmes which provide technologies on the social and scientific management of forest and rangeland resources
- b. Establish regional research stations to conduct research on specific local problems
- c. Involve and encourage Provincial Forest Departments and industries to finance research on problems relating to forestry and forest products
- d. Evolve effective mechanisms for coordination of research on forestry and forest products by Federal and Provincial Institutions and Universities.

2. **National Conservation Strategy:** Recently approved by the Government of Pakistan, this strategy has three explicit objectives:

- Conservation of natural resources

- Sustainable development
- Improved efficiency in the use and management of resources.

It reviews the issues and opportunities in forestry, soil conservation, watershed management, and natural resources and wildlife management. Long-term goals directly or indirectly associated with the forestry sector include:

- All cultivable soils to be bordered by appropriate trees (at 100 trees/ha); all cultivable wastelands to be protected by plant cover (at 250 trees or shrubs/ha) by 2015
- All cropland soils to have more than 1.2% organic matter content by 2050 through organic manure application supported by return of crop residues to all croplands by 2030
- Use of all moderately saline lands for bio-saline agriculture, and all severely saline soils for halophyte plantations by 2100
- Effective soil conservation in all rainfed and upland croplands
- Protection, management and maintenance of all watersheds through an integrated approach by 2060, with priority in the active monsoon areas
- Organized communities in all villages in upland watersheds by 2060
- 13% of the geographic area of the country comprising good and moderate forest land, poor agriculture land, and the most suitable 10% of poor forest and rangeland under 10% or more tree cover, managed on sustained yield basis by departments, owners and local communities by 2060
- Establishment of field border trees in cultivated land, on cultivable wasteland, and as part of the watershed programme
- Restoring rangelands to climatically optimum production potential of 75 tonnes total dry nutrient (TDN) by 2090
- Dune stabilization adjacent to all civil works and agricultural land by 2090
- 30% increase in feed per animal; mix of stall feeding, controlled grazing; rotational range grazing as appropriate to each eco-zone by 2010
- Sustained mangroves under reduced freshwater flows
- 35 National Parks covering all ecosystems
- Wetland Reserves covering all 27 wetlands of international importance
- Management plans for all parks and wetlands
- Proper maintenance of all parks
- Proper management plans and maintenance of all 74 wildlife sanctuaries

in the 6 zones of Pakistan

- Network of community game reserves covering all species and ecosystems
- Network of private captive breeding farms for managing prize species
- Conservation of all species on the endangered list
- International biodiversity database in these areas; research and public awareness
- Proper database, and preservation of all germplasm and medicinal plants
- Efficient and pollution-free cooking
- Grassroot institutions in all rural and most urban communities managing local common property resources by 2030.

3. Forestry Sector Master Plan: The plan is in final stage of its preparation. It addresses the following issues:

- What Pakistan needs in forest products, what production can be sustained, what gap exists between the two and how realistic is it for the forestry sector to meet total demands
- What policies and measures should be adopted to narrow this supply-demand gap, while also ensuring the protection of natural environments and preserving biodiversity
- What legislation, institutional arrangements and strategies are needed to support the policy objectives
- What programmes and investments are needed to put the strategies into effect.

It also sets forth a number of policy objectives and suggests integrated approaches and programmes. As far as forestry research is concerned, its objective is to develop means to improve the appropriateness, quality and application with particular attention to creating:

- Greater individual incentive
- Improved quality of research output
- More timely project completions
- Greater acceptance and extent of critical internal reviews
- Greater individual and organizational accountability, and
- Improved extension to promote and disseminate research results in ways that demonstrate their need, application and usefulness.

It has also proposed the setting up of provincial forestry research institutions in addition to upgrading of the Pakistan Forest Institute into a centre of excellence in forestry research.

CONCLUSION

In order to achieve the goals and objectives set forth in the National Forest Policy, National Conservation Strategy and Forestry Sector Master Plan, forestry research and the institutions engaged in this activity will have to be strengthened in coming years. This would inter alia include training of research staff, expansion and upgrading of research facilities and additional financial allocations. The forestry sector in general and forestry research in particular has been given low priority in budget allocations in the past. The situation will have to be changed if we are to realize the goals given in the above documents. Pakistan will need considerable support, both technical and financial, from international donor agencies for this purpose.

STRENGTHENING OF FORESTRY RESEARCH IN MALAYSIA

by

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Abstract

Forestry research in Malaysia is carried out by the Forest Research Institute Malaysia (FRIM) and to a lesser extent by the Forestry Departments in the states of Sabah and Sarawak. FRIM provides a wide range of research services, to the public as well as private sectors, and it is funded mainly by the Federal Government. FRIM places heavy emphasis on scientific manpower development and on creating an environment conducive to research.

INTRODUCTION

Over the past 40 years the forestry sector's contribution to the socio-economic development of Malaysia has increased significantly. In 1991, the export of timber and timber products amounted to M\$ 9.4 billion which, at 26% of the total export value of commodities, is second only to petroleum and petroleum products, creating employment opportunities for over 160,000 people.

Natural forests, which support the expanding wood-based industries, cover about 60 % of the country's land area of 32.9 mill ha. Increasingly over the last 10 years or so rubberwood, generated from replanting activities within the country's 1.8 million ha of rubber plantations and formerly regarded as cheap firewood, has become a significant source of timber for the growing local furniture manufacturing industry. Of the 38.3 mill m3 of logs produced in 1990, more than 1.2 mill m3 was rubberwood logs.

As Malaysia strives to become a developed nation, forestry development has to be sustainable and in addition to direct economic benefits, other values such as conservation of biodiversity and protection of environmental quality will become equally important.

The concept of sustained yield management has always been the guiding principle in forestry. Under the National Forestry Policy, forests are classified as Production, Protective and Stateland Forests (Table 1), of which the first two constitute the Permanent Forest Estate (PFE). These are separate from the system of National, Wildlife, and Marine Parks, which are administered differently.

Table 1: Forest Resources of Malaysia (1990) million ha.

Region	P. M'sia	Sabah	Sarawak	Total
Productive	2.85	3.00	3.24	9.09
Protective	1.90	0.35	1.40	3.65
Total PFE	4.75	3.35	4.64	12.74
National and Wildlife Parks	0.59	0.49	0.25	1.33
Stateland Forest	0.94	0.93	4.58	6.45

Stateland forests, are forest areas which are destined for conversion to other land use, mainly agriculture. However the revised National

Agriculture Policy recommends a reduction in the conversion of the Stateland Forest to agriculture. This shift in policy provides additional opportunity for stateland forests to remain under forest.

Although Malaysia's wood products currently enjoy a comfortable position in the world market, there are already indications that this position is being slowly eroded. At the same time Malaysia is still very much dependent (especially Sabah and Sarawak) on the export of logs and primary processed timbers. This situation will have to change towards greater local downstream processing to produce quality value-added timber products, which in turn would be more competitive on the world market.

EARLY FORESTRY R & D

Forestry R&D was formally started in 1929 when the then Forest Research Institute (FRI) of the Forest Department was set up in Kepong. Soon after, forestry research was started in Sarawak and Sabah by the respective Forest Departments of those states. The first research branches in Kepong covered forest botany, ecology, silviculture of lowland forests including mangroves, timber properties and utilization, and timber preservation. Later, activities were expanded to cover pulping and paper making, nursery techniques, plantation silviculture, forest entomology, forest pathology, and technical aspects of sawing, timber drying, veneer, and boards.

The results of the early research are reflected in a number of authoritative texts in areas like tree taxonomy, wood identification, forest management, and silviculture. Notable examples are the Matang Mangrove Management Plan for the mangrove forests in Taiping, Perak, widely acknowledged as a very sound management system for the sustained production of mangrove wood which at the same time does not impair fishery productivity; the Malayan Grading Rules (MGR) that pioneered our tropical hardwoods in the international markets; and the Malayan Uniform System for the silvicultural management of lowland dipterocarp forests.

FORESTRY R & D Today

Today, forestry R & D covers a wide spectrum of subjects ranging from basic sciences, economics, recreation, watershed management and forest management to wood and non-wood products. The upgrading of FRI to FRIM (Forest Research Institute Malaysia) under the Malaysian Forestry Research and Development Board (MFRDB) Act 1985 reflected the government's commitment towards strengthening the forestry sector

through R & D. The main functions of the MFRDB are as follows:

- to conduct and promote research into forest development including the production, extraction, processing, storage, transportation and utilization of forest produce and other fields appropriate to the continued development of the forestry sector and the conservation of the forest base
- to secure, where the public interest or the interest of forest development and forest industries so require, the development and exploitation of results or research, which appear to the Board not to have been developed or exploited
- to acquire, hold, dispose of or grant rights in connection with the result of any research conducted by the Board or, where the public interest of forest development and forest industries so require, in connection with the result of any research undertaken by any person or organizations
- to control, coordinate and monitor the activities of any organizations undertaking research and development programs and projects financed wholly or mainly from the Fund (Malaysian Forestry and Research Development Fund established by the Board)
- to ensure it is kept fully informed of the relevant activities of any organizations undertaking research and development programs and projects financed by the Fund
- to collect, collate and disseminate information relating to forest management and development and forest products utilization.

MANAGEMENT AT FRIM

FRIM has identified certain guiding values to facilitate and guide managers and researchers alike (Anon 1991). Among the current guiding values are:

- FRIM adopts a human resource development program to enable all scientists to achieve higher qualifications and to attain high professional standards
- FRIM encourages its scientists to interact with the clients through formal and informal meetings
- FRIM encourages collaborative and interdisciplinary research among its scientists, as well as with scientists in other institutes, local and foreign
- FRIM is committed to provide research-based services oriented to the needs of the clients in both the public and private sectors
- FRIM promotes awareness on the environmental and conservational

roles of forestry

- FRIM encourages staff participation in community activities to create a harmonious and cohesive environment within the campus.

The MFRDB has drawn up guidelines for FRIM which emphasize research-based services to the public and private sectors connected with the management and development of the forest resources and forest based industries in the country. Nevertheless, many potential clients remain ignorant of the services available within the Institute and a program to publicize the services of FRIM has been instituted.

Although FRIM is subjected to public service bureaucracy, it is essentially non-bureaucratic in its operation. The hierarchic system that exists is permeated by a large degree of decentralization of management, providing the scientists with the environment and freedom to achieve high productivity.

MAIN AREAS OF BUSINESS

FRIM's main mission is research and development in support of the continued development of the forestry sector in Malaysia. The main areas of research are

- management of natural forests
- establishment and management of plantations
- conservation of environment and genetic resources
- processing technologies for forest products
- establishment and maintenance of databases of forests and wood-based industries

Through its R&D efforts, FRIM generates outputs in response to the needs of clients for:

- the improved management of natural forests and plantations
- scientific knowledge on tropical forests
- training
- testing, advisory and consultancy services

MANPOWER DEVELOPMENT

Between 1984 and 1990 the number of scientists rose was increased from

50 to 96 (Table 2), but PhDs make up less than 25% (Table 3). PhDs are now being trained under 'split' programmes in which the universities agree to the research being done on local topics based at FRIM.

Table 2: Manpower of FRI and FRIM

	FRI (1984)	FRIM (1990)
Scientists	50	96
Assistant Researchers	26	35
Others	289	318
TOTAL	365	449

FRIM places a lot of emphasis on management and communication skills including skills in English language. A manual on research management and procedures for internal use at FRIM has been completed as a matter of priority. Two research management courses have been held jointly with local and overseas resource persons. The whole manpower development program is aimed at enabling our own scientists to interact and to provide services to a wider group of users, beyond the traditional government forest departments.

Table 3: Researchers at FRIM

Total RO	96
With PhD	21
With MSc	41
On-going training:	
PhD	21
MSc	21

To complement and support the manpower development program FRIM has signed more than 20 Memoranda of Understanding (MOUs) with local and overseas bodies for training and for R & D cooperation: about half of the current total of 40 external projects are with overseas bodies and agencies.

Special efforts are being devoted to support the forestry R & D effort in Sabah and Sarawak by way of research cooperation and the sharing of post graduate and technical training opportunities that are made available to FRIM from overseas.

Recently the MFRDB approved the setting up of a FRIM scientific award which carries a cash prize for outstanding R&D achievement by any

FRIM researcher. Also approved is the establishment of the FRIM Fellowship scheme to enable eminent overseas as well as local scientists to come to FRIM to carry out specific research with FRIM co-workers. The first FRIM Fellow under this scheme started his tenure in August 1992. All these new measures reflect the consolidation phase of FRIM's development.

RESEARCH FACILITIES

The research facilities in FRIM are adequate for its current responsibilities, and are recognized to be among the best in the region. The principal facilities include:

- Soil and Foliar Laboratory
- Fire Performance Laboratory
- Wood Preservation Laboratory
- Timber Engineering Workshop and Laboratory
- Tissue Culture Laboratory
- Isozyme Laboratory
- Seed Storage Facilities
- Hydrology Experimental Catchment
- Pulp and Paper Laboratory
- Panel Products Manufacturing Workshop and Laboratory
- Wood Extractive Laboratory
- Computerized Information Resource Base
- Herbarium, which has been designated as the national herbarium

SOURCES OF FUNDING

FRIM's budget for operation and development comes mainly from the Government. Only about 5% of the research projects are funded by external agencies. The annual operation and development budgets in million Malaysian ringgit since 1985 are given in Table 4.

Table 4: Annual Budget Allocation (\$Mal. million)

Year	1985	1986	1987	1988	1989	1990	1991	1992
Operation	5.4	6.5	10.1	9.7	9.9	12.2	13.2	14.0
Development	2.9	7.6	8.3	8.2	8.8	5.8	9.6	7.2
Total	8.3	14.1	18.4	17.9	18.7	18.0	22.8	21.2

FRIM'S CLIENTS

FRIM serves a very diverse group of clients, comprising many national and state development agencies, private corporations, non-government organisations (NGO's) and many regional and international organisations. The public sector generally requires baseline information to facilitate decision-making on policies related to the management, utilization and conservation of the national forest resources. The private sector requires techniques that can be made available through short-term research to improve their operational efficiency and productivity. FRIM has to maintain a balance between long-term strategic, and short-term applied research to cater for the needs of its clients. The following agencies have been identified as FRIM's major clients whose needs receive particular attention:

- Ministry of Primary Industries
- Various Federal and State Governments
- Forest Department, Peninsular Malaysia
- Sabah Forest Department
- Sarawak Forest Department
- Malaysian Timber Industry Board
- Malaysian Timber Industry Development Council
- Wood-Based Industries Associations

RESEARCH PRIORITIES

Recognizing the important development issues mentioned above, FRIM gives priority to the following areas (Anon 1991):

Management of Natural Forest - To ensure sustainable production of timber and non-wood forest produce, the forest has to be managed under sustainable principles. Areas where emphasis is needed include determination of sustainable annual rates of logging, methods to reduce forest damage during logging operations and means to rehabilitate degraded forests and wetlands.

Management of Plantation Forest - Projected reduction in log production in the year 2000 will force many less efficient primary processing mills to close. To cushion the impact, Malaysia has embarked on a large-scale plantation program of fast-growing timber species. It is envisaged that

forest plantations will have to supply most of the raw materials required by the wood-based industries in the future.

FRIM will investigate the cost-effectiveness and the economics of silviculture techniques employed in the growing of plantation species. Information thus derived will be used for the development of econometric and decision models and the preparation of guidelines for the overall planning and management of the industrial plantation programs in the country. Despite some initial successes and encouraging results in the plantation program, there are still numerous problems related to species selection, site and soil compatibility, quality of seeds and planting stocks, and protection from pests and diseases. Research to address and solve all these problems to improve the commercial viability of forest plantations will be given special emphasis.

Development of Non-wood Forest Products - Malaysia's forestry sector at present is very much synonymous with the wood based industries. The economic potential of non-wood forest products has not been taken seriously. This complacency is largely due to the very lucrative export trade of round logs and sawn-timber in the past. There are already many indications that non-wood forest products (such as rattan and bamboo) presents many opportunities of great economic potential. Other forest plant species have economic values as sources of food, essential oils, resins and medicines. Orchids and ferns in the forests have horticultural potential. With proper planning, natural forests can be promoted for ecotourism, which has the potential to become an important foreign exchange earner in the future. Identification and strategic development of such potentials will help towards the diversification and stabilization of the forest based industries of the future.

Impacts on Environment - Commercial forestry and other land-related operations invariably give rise to a certain degree of immediate and long-term adverse impacts on the environment. Existing guidelines administered by the forestry agencies have to be improved. FRIM's research activities in hydrology, logging, soil, silviculture and forest engineering will generate information and techniques required for formulating Environmental Impact Assessment (EIA) guidelines for forestry operations.

Improved Wood Processing Technologies - To achieve Malaysia's vision of becoming a developed country by the year 2020, emphasis is placed on the

development of value-added products through further downstream processing activities.

Malaysian wood-based industries need to integrate, modernise and adopt advanced processing technologies to minimize production costs and to increase quality. Traditional management systems based on family-owned concerns have to give way to modern production management techniques in inventory control, quality control, production planning etc. However, the uncertainty in log supply slows down the process to adopt new technology requiring capital intensive machinery.

FRIM will undertake the responsibility to assess available new technologies currently in use in developed nations to determine the suitability for adoption locally. Raw materials which have not been fully utilized at present, such as wood residues, will be investigated to assess their potential for use in the manufacture of marketable products.

Database of Forest and Wood-Based Industries - Reliable, accurate and up-to-date information on forest and wood-based industries in Malaysia is indispensable for policy and investment decision-making. FRIM will establish a comprehensive database on the forest and wood-based industries to facilitate the development of new markets and the strengthening of traditional markets.

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STRENGTHENING OF FORESTRY RESEARCH IN TANZANIA

by

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Abstract

The preparation of a national forestry research policy and masterplan have been accorded the greatest consideration. Problems facing the Tanzania Forestry Research Institute (TAFORI) have included the physical location of the Institute, staffing, funding, management, public relations and staff motivation. The steps being implemented to resolve these problems are described.

INTRODUCTION

The national forest cover of Tanzania is approximately 44 million ha, which is nearly half the size of the country, and the deforestation rate is estimated at 300,000 - 400,000 ha. per year. Forests are a source of the fuelwood which supplies about 91% of the country's energy needs. Forests are the habitat to wildlife, which is expected to become a major foreign exchange earner in the near future. Forests also supply a range of forest products including paper, sawn timber, plywood, fibreboard, building poles, traditional medicines, plants, gum arabic, fruits and food stuffs.

Because of the lack of alternatives or substitutes particularly in the areas of rural energy and construction in the foreseeable future, there will be heavy continuing dependency on forestry. This means that more investments are needed in forest production and protection.

The ambitious national forestry development objectives spelt out in the Tanzania Forestry Action Plan (TFAP), aimed at managing the country's natural resources on a sustainable basis, can only be realized if proper backstopping is provided by forestry research. Research must be an essential component in the forestry development plans for the following reasons:

- it provides a sound basis for decisions and actions
- it reduces the risk on forestry investments by foreseeing the major problems
- it provides rational criteria for the choice and adaption of new technologies and opens avenues for new products.

Only a research institution which is well equipped in terms of human and physical resources can satisfactorily fulfil the mission spelt above. However, it is universally recognised that research capabilities in developing countries (including Tanzania) are very weak (Holmers, 1989 in Lundgren, 1989).

Remarkable research achievements particularly in the fields of silviculture and utilisation were made between 1950 and about 1975. Thereafter, very little was done due mainly to lack of funds, and the research infrastructure and equipment deteriorated considerably. Also due to lack of attractive incentive packages coupled with poor working environments, many of the best brains left TAFORI in search of better working conditions. TAFORI is now faced with a challenging task of reversing the decline. This paper outlines the efforts which we are making.

DEVELOPMENTAL PROBLEMS OF TAFORI BETWEEN 1980 AND 1990

Following the transfer of research activities to Muguga in Kenya from Amani in 1948 to form the nucleus of the East African Agricultural and Forestry Research Organization (EAAFRO), the then Tanganyika government established silvicultural and utilization research centres at Lushoto and Moshi respectively in 1950 to cater for research problems specific to the country, while EAAFRO concentrated on regional research needs. During this period research was administered as a section under the Ministry of Lands, Natural Resources and Tourism.

Following the collapse of the East African Community (EAC) in 1977, the government established TAFORI in 1980, with the mandate to carry out and co-ordinate forestry research throughout the country to fill the forestry research vacuum left by the collapse of EAAFRO.

The institute is a semi-autonomous body, self accounting and managed by a governing board. It is currently under the aegis of the Ministry of Tourism, Natural Resources and Environment.

During its first decade (1980 - 1990), TAFORI experienced serious problems. These included:

- lack of substantive leadership; for the entire decade the institute was headed by an Acting Director General
- poor location of the headquarters of the institute; it was in a rural site which had poor communications with the rest of the world.
- lack of a masterplan and therefore lack of clear direction.
- run-down infrastructure and facilities
- lack of audited accounts since its inception
- scarcity of funds
- low profile among its clients and the donor community
- lack of new research activities and erratic maintenance of old trials
- problems in recruitment of key personnel
- poor dissemination of research findings
- highly demoralized scientific staff

STRENGTHENING EFFORTS BETWEEN 1990 AND 1992

Shifting TAFORI to Morogoro from Kibaha

In May 1983 the institute's board decided that the TAFORI headquarters should be shifted from Kongowe in Kibaha to Morogoro municipality. Kongowe is a village lacking many modern facilities such as reliable telephone facilities. Morogoro is centrally situated and accessible, and is also the location of the Sokoine University of Agriculture (SUA).

The move was effected within a period of four months, and the impact was immense. There was revival of morale among workers as this move created enormous hopes and expectations. The institute was also well placed to search for resources with which to tackle other outstanding problems. The institute could now easily be contacted by officials from the ministry and by other clients.

Appointment of a substantive Director-General

The management has worked very closely with the board and ensured that directives given by the board were implemented in a timely way. The board has provided the required support to the management and worked closely with the ministry. In November 1991 a Director General was appointed.

Forestry research masterplan

What next? It was agreed that we needed to create a plan for the development of TAFORI. Luck was this time on our side. The Southern Africa Development Community (SADC) had formulated a regional project

entitled: Improvement and strengthening of Forestry and Forest Products Research Institutions in the SADC Region. This Project required each member state to produce its own masterplan. We have since worked tirelessly and today we boast of having our own masterplan formulated by a team of Tanzanian scientists drawn from TAFORI and SUA. The masterplan provides the direction which TAFORI will follow in the foreseeable future.

The masterplan is made up of two parts. The first part presents the research programme while the second part sketches out the support programme. The research programme consists of the following prioritized programmes:

- community and farm forestry
- ecology, conservation of natural forests and biodiversity
- tree improvement
- plantation forestry
- harvesting, utilization and marketing

The support programme covers the physical and human resource requirements for carrying out the research programme. These include

- infrastructure and facility strengthening
- human resources development
- improvement of research library services
- improvement in the dissemination of research results
- consolidation of the finance and administrative services
- consolidation of income generating activities

Auditing of TAFORI accounts

We understood very clearly that if we were to be credible to funding agencies, we had to have our books cleared by our auditors. To this end our accounts have been audited to the year 87/88. We have also submitted our accounts to our auditors for the following years, 1988/89, 89/90, 90/91 and so far we have completed writing accounts for 91/92.

Motivation of workers

Much more has to be done in motivating TAFORI scientists and their assistants. The following motivating steps have been taken:

- all belated promotions have been effected

- meal allowances have been introduced for those who work extra hours
- an attractive scheme of service has been put into force
- whenever funds have permitted, medical services and housing facilities have been considered and offered
- opportunities to attend conferences and short courses have been offered to researchers
- transportation problems at the centres have been slightly improved by offering free bicycles to workers when these were made available to TAFORI by donors

Recruitment of key personnel

From mid-1990 the institute had lacked a director of finance and administration. Both the accounts and administration departments were grossly understaffed. There were no secretaries. Now, all departments have been strengthened by the appointment of key personnel.

CATALYTIC FACTORS DURING 1990 - 1992

Putting to full use the institutional structure

The semi-autonomous status of TAFORI offers some of the best operational conditions for research. Bureaucracy which is rampant in government circles is drastically reduced here. The management runs the day-to-day affairs of the institute with lots of flexibility and makes reference to the board only for guidance on major policy issues. Depending on the dynamism of the management lots of policies can be tabled during board meetings and commendable results can be achieved when the policies are correctly interpreted and implemented. The management is free to adopt various strategies in search of resources to develop the institute. The management only needs to work very closely with the board to come up with attractive policies to promote greater creativity and productivity. Some of our successes since 1990 can be partly attributed to the freedom given by this system. The admirable successes and advancements made by the Forest Research Institute Malaysia (FRIM) and the Kenya Forestry Research Institute (KEFRI) since they became semi-autonomous can serve as almost ideal models for other developing countries to emulate.

The semi-autonomous system of management demands, as a rule, a dynamic, aggressive and dedicated leadership. Poor leadership is bound to result in misuse of the freedom given to these institutes. There are living examples in my country where institutes of research similar to ours have ended up in chaos with scientists experiencing sufferings due to poor

leadership. In this case a strong board is called for to oversee the affairs of the institute before the situation gets out of hand.

Mode of leadership

Management of researchers in an environment characterized by scarce resources is specially demanding. We have adopted management styles aimed at helping researchers to be creative and productive. To achieve this goal we have attempted to:

- develop a team work spirit within the leadership
- adopt a frank and open attitude in explaining various issues within the institute, whether they are good or bad
- share successes and failures together
- implement a higher degree of delegation as a central goal of our administration
- adopt a tolerant and patient approach in solving a good number of administrative problems. This, our experience has shown to be not a sign of weakness, but a sign of strength.

This approach has created hope and determination within TAFORI and there is now a belief that the enormous problems that lie ahead of us can be solved. Some of our scientists have spear-headed the searching exercise for donors to assist in funding and formulating projects. This is remarkable development within TAFORI. In the past, we used to lament and wait for the management to do everything for us. It is now accepted that the exercise of searching for resources would be a responsibility of both the researchers and the managers.

Public relations

We forestry researchers are sometimes to blame for our own plight. We are inclined to forget that if the public is not sensitized to the role of researchers in society, research could be permanently forgotten. Where government funding for research is weak, we have to market ourselves and our products to our clients and sympathizers. Commercial firms spend considerable amounts of their budget promoting their business and products. We may not have such funds but efforts should be made to establish good working relations with our clients. Initially even free services could be provided to our clients to improve relations. Interactions should be promoted with policy and decision makers within the government machinery to arouse awareness and interest in forestry research among

these officials.

TAFORI has for the past two years tried hard to get known to its clients through personal contacts or meetings. The fact that our budget has been on the increase could be a result of this drive. We paid special attention to:

- parent ministry officials
- officials of the ministry of finance and planning
- the board
- news media
- forestry research and users
- possible collaborators
- the donor community

The establishment of credible working relations with other institutions is a continuous time-consuming process. While we admit a lot is yet to been done in this area, the first steps has been made and these have already had a catalytic effect on our operations for the past two years.

AREAS FOR FUTURE STRENGTHENING

Follow up actions on the national forestry research masterplan

The immediate challenge facing TAFORI is to translate its masterplan into reality, in particular, establishing the necessary infrastructure, training of researchers and the acquisition of the necessary facilities. The materialization of the research programme is dependant, foremost, on the establishment of the support programme. Three fronts that TAFORI has earmarked to pursue in realizing its masterplan include:

Diversifying sources for funds

The common explanation for the low priority given to research in developing countries is lack of resources in relation to the immensity of the prevailing problems. Yet if nothing is done, we know for sure that the gap between poor and rich countries will continue to widen, and we shall pay dearly in future for failing to invest in research. Recognising our responsibility and in view of the fact that funds from the government have been inadequate and unpredictable, TAFORI is considering to pursue the following options:

- to enter into contract research agreements with clients

- to raise fees charged to clients
- to raise fees for products invented or innovated by TAFORI scientists
- to search for donor funds within pledges made within the TFAP
- to diversify fund-raising activities e.g. raising and selling of seedlings for arid zone afforestation schemes
- to seek donations from individuals and Non-Government Organizations
- to seek grants from international research support organizations
- with prior approval of the government, to raise loans from financial institutions

To raise funds is one issue and to manage funds well is another issue. TAFORI will strive to ensure that funds are used for purposes for which they were issued.

As a tool of motivation to scientists, TAFORI had created a very attractive consultancy policy whereby the consultant retains more than 40% of the proceeds. However, in a situation like ours where salaries are very low, there is a clear danger of scientists spending more hours in fund-raising than in research activities. We need to maintain a balance between consulting activities and regular activities, which will improve the income of scientists and strengthen the organization at the same time.

Research cooperation

It is interesting to compare the high level of cooperation in research between institutions and nations in the developed world compared to the low level of cooperation in the developing world. Where resources are already scarce, the lack of a cooperative approach to our common problems is regrettable. A cooperative approach could be of advantage in the following ways, as noted by Gregersen et al., 1990. Cooperation

- reduces research costs and makes more effective use of scarce research talents and skills
- reduces unnecessary duplication of research efforts
- promotes the sharing of scientific information and expertise
- links researchers, educators and trainers to facilitate the transfer of updated information in the classroom and the field
- coordinates research programs for a more effective problem solving approach.

Cooperation is a very central strategy in the TAFORI masterplan. In recognition of the benefits of cooperation stated above, TAFORI will

pursue the principle of partnership and cooperation among scientists and among institutions within the country and at regional and global levels.

Within its masterplan, TAFORI has attempted to identify possible partners within the country with whom to collaborate. There are already positive signs along this direction.

From the regional point of view we had excellent relations with the other member states of the defunct EAC until its collapse in 1977. Forestry research used to be carried out under the auspices of the EAAFRO. At a meeting which was held in Gaborone at the end of September, SADC countries have drawn up a regional programme where TAFORI expects to play a major role. The TAFORI masterplan has also identified several regional partners with which TAFORI will seek to cooperate.

TAFORI also has special interest in the new Center for International Forestry Research (CIFOR) formed under the auspices of the Consultative Group on International Agricultural Research (CGIAR), and hopes to be associated with CIFOR's future programme in Africa.

Increased levels of motivation

The main products of a research institution are knowledge and technology, and the driving forces behind these products are personal initiative and creativity. To be effective, a research institution has to have an environment that motivates its scientists. At present our scientists are working under very difficult conditions where salaries fall short of meeting basic family requirements for food, shelter and school fees, and where even operational funds are lacking. Under these circumstances, if the leadership is committed to motivating the workers, even the slightest improvements, e.g. a rise in salary, provision of small cash rewards, provision of transport, usually results in a tremendous boost in morale and productivity. In view of this we expect in future to broaden our material incentive packages to cover the following areas:

- to strive for better salary packages
- to provide cash or other forms of material rewards for outstanding performance
- to effect timely promotions based on productivity
- to provide housing facilities
- to improve transportation and research equipment
- to facilitate attendance of short courses and international conferences
- to constantly review and improve the schemes of service

- to provide loans to meet various needs
- to provide attractive retirement packages
- to provide sabbatical leave

Although material incentives are highly appreciated in our working environment they have their limitations. To complement them, we need non-material incentives, which include:

- providing recognition and appreciation to individual and collective efforts
- cultivating a trusting attitude
- listening carefully and showing interest in workers personal problems
- visiting and interacting with scientists at their working places to familiarize oneself with their problems and discussing the problems openly
- giving encouragement and promoting the institutional vision

Acquisition of TAFORI assets

Discussions with the government are at a very advanced stage and it is expected that before the end of the year, TAFORI assets still remaining in government's hands will be handed over to TAFORI. These include both movable and immovable assets. The TAFORI capital base will be strengthened by this move.

Dissemination of research results

A clear yardstick for the performance of any research institution is the quality and quantity of its products i.e. knowledge and technology, and in particular their benefits to society. This is so because research should not be done as an end in itself. Rather, it should be in response to the needs of the community. Accordingly, efforts should be made to bring research results to the users in the simplest way possible.

A unit for dissemination and marketing of research findings is lacking and should be formed within TAFORI. TAFORI should also direct more efforts into publishing research findings, in national and regional journals and in popular fora, including publications in the national languages and through bulletins, leaflets, and radio and television programmes.

Prior to 1980, forestry research findings used to be published under a series of technical notes (silvicultural or timber utilization technical notes). These are no longer forthcoming. Plans are underway to rectify this weakness. The first TAFORI Newsletter is expected out before the end of

this year. TAFORI technical notes are expected to be published on a quarterly basis beginning 1993.

Formulation of a national research policy

Forestry research institutions have been accorded very low priority for lack of political support. These institutions do not feature strongly in national policies and consequently politicians are not duty bound to provide adequate support when the need arises. Having completed drafting our masterplan, TAFORI considers it important to have a national forestry research policy. The policy should address among other issues, the organization structure, research priorities, scheme of service, financial arrangements, staff motivation, dissemination of research results, models of cooperation with other institutions, and ratio between applied and basic research. A tool of this kind could be very useful in canvassing national support for forestry research.

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IMPROVING PRODUCTIVITY OF FORESTRY RESEARCH

by

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Abstract

Forestry research should generate factual knowledge from objective data, and extract information for decision makers from the global store of knowledge. Research driven by demand from organized associations of clients is generally more focused and productive than supply-led research. There should be more collaboration between research groups to maximise the utility of trained staff and other resources.

Leadership is deficient and management is poor in many forestry NARS. These faults can be remedied by training. No single characteristic differentiates forestry research from other research, so commercially-available business-orientated training courses should be used. Efforts to improve the quality of forestry research should be focused on training-the-trainers and on preparation of courses for in-country distance learning. There is no easy solution to teaching of skills in problem solving and reasoning.

Literature to aid new research in developing countries can often be obtained free of charge. CD-ROM bibliographies help to target the most relevant sources. Raw data and summaries should be more available through internationally-accessible computerized databases using standard protocols. Information about current research projects can be as important as access to literature.

INTRODUCTION

"Knowledge is of two kinds. We know a subject ourselves, or we know where we can find information upon it" (Johnson, c.1775).

Samuel Johnson, compiler of the first published dictionary of the English language, was of course promoting his view of direct and indirect knowledge. The distinction is valid for everyone engaged on research. It is obviously not practicable for any one person to be intimately familiar

with all aspects of the global store of knowledge. We can enormously enhance our effectiveness if we know how to search and where to look in that store.

The first point to be clear about is why, officially, we are undertaking research. Everyone at this meeting is financed from public funds. We depend for our support on national or international beliefs that the manufacture of knowledge is beneficial. This support is predicated mainly on a recognition that both practical and political decisions are likely to be improved if the decision maker has access to enough information to make a decision as informed as the current state of knowledge permits. "Enough information" usually means the costs and benefits of the various options presented to the decision maker directly or indirectly by the research community.

In this paper, I differentiate between data, knowledge and information. The data are "observations": what we can see, touch, smell, taste and hear, or otherwise assess with our human senses or with the aid of devices such as measuring instruments. Raw data are of little value in themselves. They must be processed, often by reduction and by comparison with previously acquired data.

If the result of that process is consistent with previous observations, the result is assimilated into the global store of previously-processed data which we call (factual) knowledge. If the results are inconsistent, and the inconsistency is not due to error, the results may lie in a sort of limbo of theory, awaiting the development of improved hypotheses to restore consistency. The great value of the store of knowledge based on scientific methods is that it is self-consistent and that predictions can be made from it.

Decision makers are usually too busy to shop in the store of knowledge. What they need are extracts from the store, selected chunks of knowledge which are appropriate to the decision to be taken. These appropriate selections are information. The selections should be relevant, sufficient and timely to the problem. The implications of the information may not be immediately obvious to the decision maker. Thus, there is often also an obligation for research staff to interpret the information and to present it so that the decision maker can understand both the information and its implications.

Land use decisions should depend on information about the biophysical conditions of the area as well as the cultural, economic, political and social situations. Dimensions are spatial and temporal. The complexity of the information which should be taken into account in land use decisions

means that predictions related to the options are surrounded by various degrees of uncertainty. Objective presentation of the predictions and the related uncertainties calls for well developed skills in communication.

Effective research related to land use thus involves not only the generation of knowledge but also the selection and presentation of information; the greater cogency stressed by Leary (1991).

[I am quite aware that philosophers of science will find objections to my crude differentiation of data, knowledge and information but I claim that the distinctions are pragmatically useful for the purpose of this paper.]

In discussing ways of improving productivity of forestry research, I will deal firstly with the management of research, secondly with the generation of new knowledge, and thirdly with better use of existing knowledge.

LEADERSHIP AND MANAGEMENT OF FORESTRY RESEARCH

At least 24 countries have prepared National Forestry Action Plans (NFAPs) or similar documents through the Tropical Forestry Action Programme or Forestry Master Plan processes. Most of these plans review the situation of the national forestry sector, identify and analyze the problems, and prescribe solutions through a more or less lengthy catalogue of discrete projects. Leaving aside the absurd notion that long term management of land use and forestry can be handled almost exclusively through discrete projects which depend on external finance, perhaps the most alarming feature which is common to most (all ?) of these plans is the lack of attention to the information needed to energise and sustain the projects.

This is not to say that research is completely ignored in the NFAPs. Usually, if the projects have been ranked by national priority, near the end is a brief note that the national forestry research system should be strengthened. This note rarely provides either explanation or justification. The relation between that system and the projects, or the national forestry sector, or land use, is not detailed. There appears to be little or no idea that forestry research is essential for the success of the projects, or for forestry as a national, regional, local, community, business or family activity.

A series of surveys in the middle 1980s showed that many forestry NARS ('national agricultural research services' in the terminology of the Consultative Group on International Agricultural Research) in developing countries were in a poor or very poor state (for example, Burley et al. 1989). Although some forestry NARS had grown substantially in numbers

of staff since independence, by any measure of productivity their performance was dismal. The causes did not appear to be of recent origin, nor were they related to numbers or grades of staff, nor to the size of budget, quantity of transport or adequacy of equipment. The forestry NARS had simply failed to produce results from research which were useful to decision makers.

The directors of forestry NARS were not identifying priorities which accorded with those of the national decision makers, and/or they failed to produce information relevant to those priorities. The directors appeared to be overwhelmed by the number, magnitude and complexity of the forestry and land use problems. The services had become irrelevant to national priorities and so had been progressively ignored by decision makers. The first diagnosis is thus that leadership of forestry research in developing countries is generally defective.

The need to encourage a distinctive institutional culture, favourable to scientific enterprise, is stressed by Nickel (1989). Since directors of forestry NARS are commonly appointed for reasons which are unrelated to their skills in leadership and management of science, there is a clear and substantial need for training of these directors. The two courses offered by IUFRO's Special Programme for Developing Countries in Africa in 1986 and 1989 (Temu et al. 1987, Iyamabo 1990) were notable in drawing attention to the very limited attention given to leadership and management of forestry NARS. This lack contrasts with the considerable efforts in agriculture (TAC Secretariat 1986, CIP 1988).

It is well understood that demographic increase and other forces are greatly increasing demands for land and other resources in developing countries. When skilled human resources are limited, it is all the more important to sort out what are the priority tasks for the forestry NARS. "If politics is the art of the possible, research is surely the art of the soluble. Both are immensely practical-minded affairs. Good scientists study the most important problems they think they can solve. It is, after all, their professional business to solve problems, not merely to grapple with them" (Medawar 1967). Among the most important tasks of the director of a forestry NARS is to make those identifications and that ranking. The results of that process, incorporated into strategic and operational plans, determine what research management has to deal with from day to day.

Once the objectives of research have been determined and agreed, its management is not all that different from that of any other business. Almost all countries have public and private schools of business

management, yet foresters rarely attend them, and forest research staff even less. The relatively long production period of trees, compared with that of agricultural crops or industrial products, does not necessarily imply that forestry research itself is a lengthy process. There is no single characteristic of forestry research which requires it to be managed in a special way. Whether the research is financed from public or from private funds, the managers need business training.

Most applied and adaptive forestry research could be run as a business, the research being contracted out by the forest owners, managers or industrialists and undertaken by the research staff. Experience in industrialised countries has shown that the customer-contractor principle does not function adequately for some strategic and most basic research, where the relationship between the research and the field problems may be indirect or difficult to quantify. In this latter case, the forest owner, manager or industrialist may not be aware of the benefits which such indirect research could provide, and for this reason it is customary for research staff themselves to play a major role in defining the aims and scope of the research plan (Mees 1961).

However, most of the major problems or problem areas in forestry and land use are complex, being caused by the interaction of many factors. Commonly, many of the factors originate outside the forestry sector. Solution or mitigation of the problems, therefore, requires both interdisciplinary research and composite task forces or project groups. These teams are very likely to require staff from outside the traditional forestry sector. Skills in communication are a prerequisite for creating and managing such groups. There is no *a priori* reason why foresters should invariably lead these teams.

TRAINING IN THE METHODS OF FORESTRY RESEARCH

Although training in scientific methods is more generally provided than is training in leadership or management, the methods for forestry research are still not sufficiently inculcated in staff who are new to research.

Training is usually given in the use of electrical and mechanical equipment but manual skills are too often left to the "Sitting by Nellie" method. This phrase summarises the process by which apprentices were left to watch and imitate a more experienced textile worker ("Nellie") during the Industrial Revolution of the 18th century in Britain. It is a notoriously inefficient method of learning, only slightly better than learning from lectures.

Formal training, making use of advances in pedagogy and industrial psychology, is more reliable and cheaper than Sitting by Nellie. More participants learn more, learn faster and learn more thoroughly. These modern methods are still little known in developing countries. It is clearly impracticable as a long-term solution either to run courses exclusively in the industrialised countries or to import external teachers into the developing countries.

One solution is to train-the-trainers, so that knowledge is distributed widely at each stage. A major problem, especially for the training of research staff, is that quality control becomes more difficult as the number of trainers multiplies and as they become geographically dispersed in each country.

A second solution is distance learning, formerly known as correspondence courses. By far the largest university in Britain is now the Open University, which operates almost exclusively by distance learning. In-house teaching is limited mainly to intensive sessions on laboratory methods which still cannot be taught efficiently from a combination of books, radio and television. It is increasingly economic to use multiple media for teaching, as the costs of colour printing and micro-computing fall sharply. The same teaching materials can be used by those who learn more easily from visual images as well as by those who are happy with print. Although training materials such as programmed texts are tedious to prepare, they do seem to be efficient when there is only one or a small number of possible correct answers to any question.

Turnover of staff tends to be high while research remains a generally unpopular career option in many developing countries, compared with administration or line management. Therefore, a high proportion of staff in forestry NARS in developing countries is continually in need of basic training, compared with the proportion in the industrialised countries. Since most formal research staff in developing countries are paid from public funds, foresters alone cannot improve the attractiveness of a research career by changing the basic terms of service. They can, however, make the unwilling recruits more efficient by providing more effective training and by having a more relevant and focused programme of work. Incentive schemes, such as those developed for FRIN in Nigeria and FRIM in Malaysia, should both sharpen skills and help to retain staff; see papers by Kio and Abdul Razak in this volume.

Distance learning for forestry research is in its infancy for developing countries. The courses on experimental design and statistical analysis, which I initiated through IUFRO's Special Programme for Developing

Countries, and which have been developed by the Applied Statistics Research Unit at the University of Kent in Britain, are just a start on a massive problem.

Science is essentially a voyage of exploration, full of unknowns. While distance learning can be used to teach technical skills and to improve declarative knowledge, it is not clear that thinking skills (problem solving and reasoning) can be taught in the same way. It is obvious that thinking is an invisible skill, even though the results should be visible. Much effort is now going into ways of making thinking "visible" (Brown 1989). The problem is that these methods require the presence of teachers who are themselves experienced in research. This means that the number of students who can be taught formally the methods of scientific reasoning will be small compared with those who can be taught technical skills through distance learning.

I do not know any solution to this problem, but I am quite sure that much research by forestry NARS is unproductive because the staff have not been taught to reason effectively. Fifield (1985) summarised Berry's "Ten Commandments" for research training (see annex). It is only too evident that some cultures have difficulty in accepting and implementing a number of critically important aspects of a scientific approach, such as "The need for openness and constant discussion". The need to identify, acknowledge and learn from mistakes (Anderson 1991) is also hard for some cultures but vital in science (Medawar 1985).

A frequent response by directors of forestry NARS to the shortage of trained and skilled staff is simply to add more bodies. Some of these bodies may have paper qualifications, even postgraduate academic degrees, and may immediately have divisions or departments created for them. These extra bodies are a drag on the NARS unless there are appropriate and approved research and institutional development plans, together with training and operational support. Since the decline or continued poor state appears to be independent of size or staffing, the solution is NOT invariably the addition of more staff (the preferred solution indicated by the directors of NARS in response to the Minnesota questionnaire (Bengston 1986)).

EFFICIENCY IN RESEARCH

The previous section did not imply that the only suitable staff are those who have scientific postgraduate training. Instead, staff should be suitable for the tasks to be completed. If the major challenge is a survey of

national biodiversity, then parataxonomists (field collectors) may rapidly increase the bulk of the national collections. However, that does not solve the problem of definitively naming the specimens. This task still requires highly skilled and trained taxonomists. The parataxonomists can make the task proceed more efficiently by using statistically efficient methods for collection of specimens, by preparing and curating the specimens and by assigning tentative designations. Such appropriate division of responsibility would be normal in a business. It is surprising that some major institutions dealing with biological taxonomy find it to be innovative. The 1992 international convention on the conservation of biodiversity increases greatly the need for research in systematics so there is a substantial premium on efficiency of operation.

Efficiency can also be improved greatly by ensuring that skills are concentrated where they are needed. During the 1970s and early 1980s, the paper company Cartón de Colombia developed an efficient research programme with a very small core staff. Cartón de Colombia made extensive use of in-country collaborators, including university staff, as well as external consultants who were well paid and hard worked. The consortia of industrial reforestation companies and university faculties have worked well in Brazil. A key factor has been that the research is demand-driven, not supply-driven solely by the curiosity of the research staff. Larger companies which have needed more research, or more specific research, than could be provided through the consortia were given a head start in setting up their own research units. Smaller companies, which could not afford their own research sections, stayed with what the consortia could offer.

These examples are taken from the private sector but, as I indicated before, there is no reason why much government research could not also be run as a business. Perhaps the reason why this does not happen more commonly is that the forest owners and managers do not frame their research requirements in a way which facilitates task-specific contracts.

Conversely, much research which should be taken up by line managers or forest farmers often remains unused. Academic ecologists seem to be particularly poor at pointing out the practical implications of their research, but foresters are as much to blame in not framing their needs for research in a way which is attractive to academic staff.

The traditional training of professional foresters was broad-based, frequently including the acquisition of many vocational skills. In Western Europe, the practical skills now tend to be played down, as being not academically respectable. A result is that graduates are not as immediately

employable as they used to be, unless they have taken personal steps to acquire these skills outside the formal university courses.

However, the course time which might apparently have been saved does not seem to have been used to broaden appreciably the academic background. The rapid expansion of the frontiers of knowledge makes it difficult to decide how courses should be adjusted from year to year. The same problem affects research staff after they have finished formal training. For example, it is now clear that tree breeding strategies could have been improved years ago if more notice had been taken of common practices in animal breeding. Best Linear Unbiased Predictor and mixed linear model methodology is a standard procedure in the identification of superior progeny in animals but is only just beginning to be used in forestry (Birks 1992). Modelling techniques used for bio-economics in ocean fisheries might also be applied to natural tropical forests (ODA 1992).

INFORMATION SERVICES FOR AND FROM FORESTRY RESEARCH

I started this paper with a quotation from the first English lexicologist, who recognised more than two centuries ago that it was not practicable to be personally knowledgeable in all relevant fields. The problem is particularly acute for foresters in poorly funded NARS which often devote only minuscule resources to ensuring that staff are kept informed about developments elsewhere. Different tactics are appropriate for the satisfaction of personal and institutional needs for research information.

At the personal level, most reasonable requests for literature emanating from individual research staff in developing countries will be fulfilled at no charge by individuals and organizations in industrialised countries. For example, all the Forest Experiment Stations of the U.S. Forest Service issue quarterly or bi-annual lists of publications, which are distributed free of charge on a first-come, first served basis.

The location of relevant literature is facilitated in various ways. Many research and development projects issue periodic free newsletters, containing references to the literature produced internally or noted by the project. Most of the almost 250 research groups of the International Union of Forestry Research Organizations (IUFRO) also issue free newsletters.

The first coordinator of IUFRO's Special Programme for Developing Countries (SPDC), Oscar Fugalli, arranged with CAB International for the privilege of making a personal selection from Forestry Abstracts, Forest Products Abstracts and Agroforestry Abstracts, and issuing a free

information bulletin containing the selections to individual interested staff in developing countries. Forestry projects supported by the Netherlands also made use of the same selection, distributed through the Bos Foundation at no charge to the recipient. The SPDC selections were deliberately printed on only one side of the paper, so that recipients could cut them out individually and form a card index.

The location of grey literature, published informally, is more difficult. The conventional abstracting organizations do not handle grey literature, partly because of doubts as to its reliability. However, some organizations attempt to reference grey literature, at least in Europe (for example, the computerized bibliography SIGLE - system for information on grey literature in Europe - compiled by EAGLE, the European Association for Grey Literature Exploitation).

Few research projects exhaust the possibilities of their data, or prepare wholly adequate summaries. Institutional or national databases may afford as much value, through re-workable data, as libraries. There remain many cultural problems in securing open access to internationally-valuable data. However, as the jealous teams in the U.S. Long-Term Ecological Research projects have reached agreement on common protocols and access, it should surely be possible for developing countries to do the same. There is no real shortage of suggestions for common standards for methods of field assessment and summary (for example, Sommer & Dow 1978, MacDicken, Wolf & Briscoe 1991, Alder & Synnott 1992). Work to harmonize databases and/or facilitate data exchange is in progress through the TROPIS project being planned by CIFOR (Center for International Forestry Research).

There is often a cultural dislike of re-working existing data, as being somehow less prestigious than starting new field or laboratory research, even though the work may be no less challenging and useful. The increase in power and user-friendliness of computer software may help to overcome these inhibitions.

At the institutional level, the research staff should have access to libraries of literature and of projects. A week in a library is very much cheaper than the cost of establishing a new field experiment. It is often difficult to obtain from a research client an indication of the required precision of prediction. However, this information should be supplied, because it enables the research staff to decide if a best guess based on literature might be acceptable, rather than starting new research.

Rapidly rising real costs of books and journals, and difficulties of obtaining hard currency, make a librarian's job a nightmare in many

developing countries. Although it is of course desirable to have continuous runs of the principal periodicals it is no longer possible in many countries.

Fortunately, the costs of CD-ROM players and search-and-retrieve computer software are both falling fast. This makes feasible for almost any research station the acquisition of a low-cost micro-computer, CD-ROM player and standard abstracts on CD-ROM. The recent production by CAB International of TREE-CD, half a century of forestry and forest products abstracts on CD-ROM, makes possible a tremendous increase in search speed and complexity of retrieval profile. Productivity of research can be increased substantially by consequent better targeting of searches and location of the truly relevant literature.

Of course, this is no free lunch. The TREE-CD is expensive partly because of the density and completeness of the indexation of the abstracts, but I am convinced through personal experience that the cost is well justified. Moreover, the TREE-CD is attractive to donors because it is a tangible and durable item which can be used as a common good and has great potential for multiplication of benefits. The chief disadvantage of TREE-CD is the high cost of updating. The royalties for the search-and-report software on each disk represent a significant and unavoidable proportion of the cost. Users in developing countries who want only single copies would of course have to pay the full retail price. However, a group of users (such as a regional research programme) can negotiate a normal commercial discount for bulk purchase and then allocate the reduced-cost disks among their members. Donors supporting such regional programmes could, and do, increase the value of their assistance by financing these bulk purchases (J. Gilmore, CAB International, personal communication).

Better selection of relevant literature, through newsletters or CD-ROM, allows librarians to make optimum use of scarce resources by requesting copies of only those papers and books which are directly required for approved research. Inevitably there is a loss of discovery through serendipity but one could argue that this is not serious for adaptive and applied research. Although reprints from primary publications are often available on request at no cost to developing countries, the large component of highly skilled manpower in the preparation of secondary literature means that abstract journals are rarely free. Some institutions with global mandates or some donors may purchase and distribute subscriptions for project partners, but this support is limited to the lifetime of the project. Buyers in countries which are members of CAB International receive automatically a discount of 25 per cent on the cost of abstracts, whether on paper, diskette or CD-ROM.

It takes time for literature to filter through into abstracts and onto CD-ROM. Research detected through CD-ROM is likely to be at least 2-3 years old. In parallel, therefore, research stations should have access to catalogues on current projects. Using the same argument as applies to literature consultation, if an existing project is likely to produce the desired data, why start a new one? There is a surprising dearth of project catalogues, either on a national scale or on activities of individual donors. The deficiency is about to be remedied as regards European institutions with forestry research connections in developing countries. Focal points of the European Tropical Forest Research Network have agreed to contribute to the Commission of the European Communities database on agricultural research projects (AGREP). If the European effort is successful, we believe that CEC funds may allow expansion to global coverage. Information about global and regional forestry research networks was compiled by the TAC forestry panel (CGIAR 1990) and is being updated through CIFOR's FORNIS project.

Personal and institutional productivity may be enhanced also by better communication through attendance at professional/technical meetings. Where national telecom services are sufficiently advanced, electronic mail and video-conferencing may be cost-effective, although hard data are difficult to locate. Most developing countries are not yet at a stage where either of these techniques is a viable option, partly because of the high taxes imposed by governments on international telecommunications.

A corollary of the previous paragraphs is that both individual staff and forestry NARS should take care to collect data according to standard procedures and store both data and results in such form that they can be accessed and re-worked by future projects, nationally and internationally. Similarly, the dissemination of results could be much improved. If the clients for research are identified and cultivated as they should be, research would become demand-driven and communication easier.

An unfortunate side effect of the "projectization" of research, caused by reliance on short-term donor funds, is often the distribution of results as unrefereed project documents. This process suffers from two grave defects. Firstly, the results are not subject to impartial scrutiny by international referees before dissemination. Secondly, the distribution process may be adequate while the project is in action but it is commonly difficult or impossible to obtain copies of publications once the project has closed.

Forestry NARS, whether projectized or not, should place great stress on internationally acceptable publication of results. This can be a disheartening process for the beginner. Some cultures may find blunt

rejection of manuscripts by editors quite unbearable and may establish national journals without referees as an alternative. However, this is not a valid alternative and will be regretted in time. Inexperienced research staff might learn to write acceptable papers by reading relevant guides (Cooper 1964, Barras 1978, Booth 1984, Stapleton 1987, Day 1989) and by publishing short pieces in newsletters whose editors are generally more forgiving than those of journals.

CONCLUSION

This paper has concentrated on the forestry NARS but the principles apply equally to universities, polytechnics, non-government organizations and farmers' associations. There is great scope for improving the productivity of forestry research under all but the grimmest circumstances (Palmer 1989, FAO 1992). A very large expansion of in-country training is required. The prime need is for training of research directors in leadership, secondly the training of programme leaders in research management, and thirdly the continuous training of project staff. At present, this ranking of priorities is inverted, with the result that the project staff are frequently frustrated by incompetent leaders.

The world interest in forestry in developing countries means that, given adequate leadership, the material needs for better research should be satisfied without much difficulty.

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**Annex: Berry's "Ten Commandments" for research training
(Fifield 1985)**

1. techniques of research
2. development of hypotheses by analysis and synthesis
3. testing of hypotheses by experiment and experimental design
4. definition of questions in order to be able to
 - (a) disprove scientific hypotheses, and
 - (b) aid practical decisions

5. selection of material for analysis, bearing in mind the possibilities of bias and the requirement for quality
6. need for openness and constant discussion
7. value of presentation to small groups, even at the early stages in the training period
8. opportunity to obtain an advanced understanding of an area of science *via* an in-depth investigation of an appropriate research problem
9. production of publishable work for both thesis submission and inclusion in a scientific journal
10. development of the ability to bring a project to a successful conclusion

TRAINING AND DEVELOPMENT OF SCIENTISTS FOR FORESTRY RESEARCH IN NIGERIA

by

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Abstract

The main problem facing forestry research bodies in Africa is the difficulty of attaining a critical mass of scientists. Due to weak economies, galloping inflation and depreciated currencies, many countries are unable to afford the high cost of training their research personnel overseas. Increasingly, countries with a good tertiary educational system have to look inwards for training and upgrading the expertise of their research staff.

Taking the Forestry Research Institute of Nigeria (FRIN) as an example, this paper reviews the education and training requirements and management strategies adopted to ensure a steady stream of highly trained research manpower with emphasis on training for higher degrees, particularly MSc and PhD.

INTRODUCTION

The quality and productivity of a research organization are determined by the level of training and the experience of its research staff. In a survey of

forestry research administrators in developing countries, Bengston and Gregersen (1988) found that improvements in the level of training of researchers received the highest average rating of the 24 factors associated with increasing research capacity. In the same survey, "stability of funding from year to year", "library and information services", and "total funding level" took second, third and fourth places respectively.

Attainment of a "critical mass" of trained scientists for forestry research has eluded most forestry research bodies in Africa. An FAO review (1987) found an average of 12 forestry researchers per organization in 41 national institutes of forestry research in sub-Saharan Africa. This compares to an average of 61 in Asia and the Pacific countries, 20 in Latin America and the Caribbean, 28 in the Near East, and 28 in all four regions combined. Similarly, Africa is the only region in which the average number of technicians per institution exceeds the average number of scientists.

Wasawo (1989) has listed three crucial conditions for the identification and retention of high quality staff in a research organization: to put in place a scheme of service that enables an aspiring staff member to see clearly what his prospects for moving up the ladder and career development are likely to be; to be rigorous in establishing the minimum qualifications for recruitment into the lowest cadre of the research establishment; and to arrange for an imaginative post-graduate training programme for the research staff.

Very few research directors have a free hand to determine the structure and career prospects of the research institute. The possibility that a research establishment is able to attract and retain staff of high calibre is determined by the national economic policy. If forestry is accorded high priority, then the scheme of service for the forestry research will be structured by government to attract suitable candidates. Minimum academic qualifications for entry follow logically and reflect how attractive career prospects are in the organization.

Although training in general is also subject to national educational policy in terms of postgraduate training locally and especially overseas, the training environment is very much under the control of the director and his management committee. Where funds are not limiting, it is possible to plan well ahead and to seek placements in overseas institutions and universities for a roster of junior research officers. However, during economic recession and at a period of currency devaluations, training overseas through internal sources of funding becomes virtually unattainable.

In this paper, the experience at the Forestry Research Institute of Nigeria (FRIN) in maintaining a viable training programme during a period

of national economic depression will be recounted. The lessons learned from FRIN can be used to exploit new opportunities presented by the admission of forestry and agroforestry research into the CGIAR system.

EDUCATION AND TRAINING REQUIREMENTS

The Federal Ministry of Science and Technology guidelines for the management of research institutes specify that all categories of staff should be given every opportunity to train in areas relevant to their responsibilities and the duties in the institute - scientific courses for research staff, management courses for research administrators and administrative officers, and specialized courses for intermediate and junior staff. Training priority is based on the needs of the Institute, due regard being given to the trainees' aptitude.

The objectives of in-service training in FRIN are:

- to satisfy identified job requirements in the institute;
- to enable an officer to acquire more skill and knowledge in his chosen field;
- to upgrade diligent and industrious officers;
- to expose experienced scientists to contemporary developments in general management techniques; and
- to achieve and sustain a high degree of efficiency in the institute.

In accordance with the policy of government, the Institute encourages training in local universities subject to the availability of suitable facilities. This policy has distinct advantages which include the following:

- (a) continuity of an ongoing research project even while a staff member is taking a course;
- (b) effective utilization of available local facilities to solve local problems;
- (c) the possibility of inducing local universities to initiate courses not otherwise available; and
- (d) reduction in cost of training to the institute.

Training programmes are designed for all officers on USS¹ 1-15. The junior staff (USS 1-5), who are in the technical and secretarial cadres, are given on-the-job and formalized institutional training where necessary to improve their skills and prepare them for higher responsibilities. This training is undertaken either on special courses run by the Institute's Education and Training Division or in approved government training schools. Table 1 shows the training courses available for the senior staff.

Table 1. Training Requirements for the Senior Staff of FRIN

GRADE	TRAINING COURSES
Technical/Laboratory Technologies on USS 06-08	Attachment training in relevant subjects; duration depends on the subject. However, undergraduate first degree courses are excluded.
Professionals on USS 07-08	Postgraduate training for higher degree (MSc, PhD) where appropriate.
Administrative/Executive on USS 06-11	Induction course of 2-6 weeks and management course not exceeding 9 months.
Professional Officers on USS 09 and above	Appropriate courses designed to up-date professional and management skills.
Professional Officers on USS 12	Advanced management courses of not more than 3 months duration.
Professional Officers on USS 13 and above	May participate in advanced management courses of short duration.

EDUCATIONAL AND TRAINING POLICIES

The training requirements for scientific officers shown on Table 1 demonstrates recognition of the need to supplement pure scientific education (BSc, MSc and PhD) with training in management skills, particularly for middle- and higher-level research managers. However, in the past twelve years, as a matter of deliberate policy, greater emphasis was accorded the preparation for higher degrees (MSc and PhD) to accelerate

USS is University Salary Scale. Research Institutes in Nigeria enjoy the same salary structure as for the Universities.

the acquisition of new technology and to enhance research performance.

The skills gained in the course of a well designed PhD programme cannot be acquired in any other way: gaps in knowledge are filled by appropriate course work; computational abilities are improved through exposure to the use of computers and other modern data-processing and information-delivery facilities; and capacity for independent work, deductive and analytical reasoning, problem diagnosis and resolution, is greatly enhanced. The PhD student also learns how to work to a tight schedule and develops the habit of working unsupervised for long hours, a habit which persists even after the accomplishment of the research programme. The feeling of self-actualization which results from the completion of a difficult postgraduate research programme serves as a tonic and a motivator for subsequent routine research endeavours. Above all, the research outputs of the officer (not necessarily in terms of publications) useful to the practice of forestry in Nigeria is increased enormously.

This policy was implemented in the 1980s when the oil boom ended and funds for research and postgraduate training became very limited. For instance, in 1984, 1985 and 1986, no new postgraduate scholarships were awarded by the Federal Government, even for training in Nigeria. The implementation was made possible through the special relationship developed between the Forestry Research Institute of Nigeria and Ibadan University, Obafemi Awolowo University, University of Nigeria, Nsukka, Ahmadu Bello University, Zaria, and Jos University.

Once a training programme has been approved for a research officer, he is asked to select an appropriate problem from his normal routine research schedule. This is presented to the university closest to his station for acceptance and approval. The candidate is admitted to the PhD programme of the chosen university on a part-time basis. In reality, FRIN management redesigns the officers' work schedule so that he works full-time on the chosen research subject under the joint management of supervisors based in the institute and the university. The officer is given every encouragement and his progress carefully monitored. His research work receives top priority for funding.

The implementation of this policy has proved to be the most cost-effective method of not only undertaking routine applied forestry research but at the same time of accomplishing man-power training at the highest level. It takes full advantage of the government's highly subsidized education in the university. It is estimated that to train a PhD candidate in Britain or United States of America costs US\$60,000-70,000. The equivalent cost in Nigeria is less than 10% of that.

Other supplementary training of scientific staff includes in-house seminars which are held at least once a month, attendance at external conferences, participation in short courses locally and overseas (whenever it is possible to get full sponsorship for board and return air ticket) and other targeted local and overseas workshops.

ANALYSIS OF A 15-YEAR TRAINING ACTIVITIES

The success of FRIN's training policy can be judged by comparing the annual qualifications acquired by staff during three quinquennial periods: 1975-79, 1980-84 and 1985-89 (see Table 2).

Table 2. Number of Higher Degrees Completed by FRIN Research Staff (1975-89)

Period Higher Degree	1975-79	1980-84	1985-89	Total
MSc	30	32	7	67
PhD	3	15	15	33
Total	33	47	22	102

Source: Kio (1990)

Table 3. Qualifications of Research Staff of FRIN in 1984 and 1989

Year Degree	1984		1989	
	No.	%	No.	%
PhD	12	14	20	30
MSc	47	55	40	60
BSc	27	31	7	10
Total	86	100	67	100

Source: Kio (1990)

In the first period (1975-79, before the introduction of the new training policy), the ratio of staff that graduated with MSc to those with PhD was 10:1. By the second period (1980-84) the ratio had narrowed down to 2:1,

with 32 MSc to 15 PhD. By the third period (1985-89) the position was reversed at 1:2 (that is, 7 MSc to 15 PhD). Ultimately, most of the present holders of MSc will register for the part-time PhD programmes. In the academic year 1989/90, only one research officer was registered for the MSc degree, while 20 research officers were pursuing part-time PhD programmes.

Table 3 shows the distribution of the qualifications of scientific staff in 1984 and 1989. In 1984, the proportion of staff with PhD degrees was 14%, compared to 30% in 1989. Similarly, holders of BSc degrees made up 31% of the total scientific staff strength in 1984, in contrast to 10% in 1989.

ACHIEVEMENTS AND PROBLEMS

Table 4 shows the productivity of research staff in terms of publications, for the period 1975 and 1989. Comparison of these figures with the number of higher degrees completed by FRIN research staff for the same period (Table 2), shows a strong correlation between staff productivity and number of higher degrees produced from one five-year period and another.

Table 4. Productivity of Research Staff of FRIN (1975-89)

Type of Publication	Period 1975-79	1980-84	1985-89	Total
Conference Proceedings	106	256	165	527
Technical Reports	2	6	6	14
Scientific Papers	21	3	15	39
Journal Articles	61	65	42	168
Monographs	2	7	4	13
Total	192	337	232	761

Source: Kio (1990)

Table 3 also shows that the staff strength diminished by 22% between 1984 and 1989. The majority of the losses occurred among holders of PhD degrees. This period coincided with the creation of Departments of Forestry in one old (University of Benin) and 4 recently-established universities (Federal University of Technology, Port Harcourt, Federal

University of Technology, Akure; Federal Agricultural University of Abeokuta; and Federal Agricultural University, Makurdi). Since holders of PhD degrees tend to be more productive than less-qualified staff, they are a target for poaching by young universities anxious to build up a corps of highly experienced and qualified academic staff in the shortest time possible.

Unfortunately, 1984-89 was also the time of government austerity measures which placed an embargo on employment in the public service, and so prevented fresh recruitment into lower cadres of the research establishment. Thus, the greater danger to the institute, as demonstrated in Table 3, lies in the development of an unhealthy age profile.

The major difference between service in the university and that of a research institute is that the university allows for multiple professorships in a single department, following the American tradition. In contrast, the research institutes are highly hierarchical, with a single Director at the apex, three or four Assistant Directors, eight or nine Chief Research Officers, etc., following the British tradition. For most officers, the post of Chief Research Officer (USS 13) represents the peak of their career expectation. The next post of Assistant Director (USS 14) can only be attained when a vacancy exists.

The highest loss of staff occurs among the rank of Chief Research Officers. For this cadre, the invitation from a university is virtually irresistible in spite of the current disadvantages of an academic career in Nigeria. It is sufficient that the lateral move to university will open an unimpeded road to the post of a professor at some future date.

The solution to this problem appears to be to introduce multiple directorships in research institutes, with the top position redesignated either as Director-General or Director and Chief Executive. Once parity with the university is achieved, the brain drain from the research institutes will be greatly diminished, or it may in fact provoke a reversal in which the drain will be from the university to the institutes.

CONCLUSION

In spite of the success of the training and man-power development plans adopted by FRIN in the last twelve years, the situation is far from satisfactory. Sole reliance on national training facilities has meant that the institute is cut off from the main stream of scientific developments in forestry research. As an example the technology for rapid data processing and word processing made possible by the use of personal computers, is

only just reaching Nigeria. If links with overseas training and research institutions had been maintained, FRIN should have been able to keep abreast of these technologies.

Bridging of gaps in technology and improvement in the available training opportunities overseas (particularly in Europe and America) will be the sort of problems to be addressed under the national agricultural research system capacity-building and networking aspects of the mandates of CIFOR and ICRAF. When these programmes eventually take off, FRIN will be in a very good position to take advantage of the renewed opportunities to train some of its staff overseas. The training environment can also be expanded to accommodate exchange of staff for postgraduate training in a network involving neighbouring forestry research bodies.

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TRAINING AND DEVELOPMENT OF SCIENTISTS FOR FORESTRY RESEARCH IN THAILAND

by

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Abstract

The main centre for the professional training of forest scientists and foresters in Thailand is the Forestry Faculty, Kasetsart University (KUFF). Masters degrees were offered in 1967 and doctorates in 1991. The level of forestry research is still low due to problems in funding and organization. Technology transfer is in particular need of strengthening.

INTRODUCTION

During the period 1900- 1960, Thailand was a forestry-based country. In the early years, teak was the main species of interest. Not surprisingly, when the Royal Forest Department (RFD) was established, its headquarters was located in Chiang Mai and its main aim was to handle the logging operations in the teak concession area. Some notes about Thai forestry, written by foreign experts, provided the guidelines for the department, which was at that time under the administration of the Ministry of Interior.

The history of forestry manpower development can be divided into 5 periods:

1. In the first period, a few Thai students were sent to England for forestry education up to Bachelor of Forestry degree. The contribution of this group to the development of forestry science was relatively small. Some members of this group became lecturers at the Forestry School.

2. In the second period, about 10 students were sent to Dehra Dun in India for forest technician training. Phya Vinit Vanandorn, the well known forest botanist, was among this group.

3. In the third period, which was the turning point for forest research and development, students were sent to Pinmana Forestry School in Burma. The course was conducted by British lecturers. Professor Thiem Komkris, one of scholars in this group, is considered to be the father of modern forestry science in Thailand.

4. In the fourth period, students were sent to the Philippines, after completing studies at Prae Forestry School, for BSc degree training.

5. In the present period, students have studied in the U.S.A., European countries, Japan, and Australia. Most of them received their first degree from Kasetsart University, which has become the stronghold of manpower at present.

CONSTRAINTS IN R & D IN THAILAND

The importance of research and technology transfer in Thailand was recognized with the establishment of the National Research Council of Thailand (NRCT) in 1966 to function as the main governmental body responsible for research and development in the country. NRCT is responsible for policy and planning on R & D, fund raising and allocation, coordinating research, developing an information base on manpower, and developing an expert information base.

NRCT has 10 committees, including one on agriculture and biology, which covers forestry research. It is clearly understood that effective promotion of forestry R & D should be based on the modernization of research institutions, consolidation of the entire R & D system, promoting both basic and applied research, promoting development research in both the state and private sectors in all areas.

As an agricultural country, Thailand is facing the problems of low productivity, unsuitable land uses, small land holdings for agriculture, lack of farmer organizations, water shortage in the summer, and climatic changes. These problems force the people to occupy more forest land for cultivation and illegal settlement. Today, about 10 million people occupy degraded forest land. People also encroach the coastal zone both for settlement and aquaculture.

NRCT developed the first National Policy and Plan on Research in 1977. Three more plans were developed in later years.

The first plan (1977-1981), was aimed to improve the overall capability of research in the government sectors. All kinds of research were

supported regardless of their priority.

The second plan (1981-1986), was designed to conform well with the Fifth National Economic and Social Development Plan. In this plan it was aimed to develop the country to improve national security. Additionally, the plan was drafted to ensure efficient uses of natural resources. Cooperation among governmental agencies as well as between the state and private sectors was emphasized. As regards forestry research, the second plan considered the importance of silvicultural research, forest genetics, tropical pines, fast growing trees, biotic enemies, mangrove forest, watershed management, and wood utilization.

In this plan, wood for energy was considered to be a good source of alternative energy. More research on this issue was suggested. During this plan, Thailand had only 0.8 researchers per 10,000 people and research funds of about 0.2 per cent of GNP (NRCT, 1981)

In the third plan (1987-1991), national policy on research was revised. The objectives of research were to promote welfare, capability, and well-being of the people. Research was to be conducted to solve economic, social, cultural and environmental problems in order to maintain national integrity and culture. Research had to enhance technical knowledge which may lead to the development and evolution of science and technology. The plan emphasised farming systems related to environmental problems. Land use, land reform, silvicultural methods, tissue culture, ecology, as well as flora and fauna inventories were also listed as the main areas of research recommended (NRCT, 1987).

In the Seventh National Economic and Social Development Plan (1992-1996), policy and planning on agricultural and forestry research was highlighted to improve the efficiency of production and product development. Demand and supply research was suggested as well as research on post harvesting, biotechnology, marketing, contract farming, farming systems, soil improvement, irrigation, use of agricultural wastes, and the release of new agricultural products. In this plan, NRCT concluded that there were 9 researchers per 10,000 people in Thailand but only three of them were active. Research funds in 1984, 1985, 1986, 1987, and 1990 were 0.29, 0.24, 0.19, 0.22, and 0.13 % of GNP respectively.

NRCT has just completed the fourth plan to cover the period of 1992-1996 (NRCT, 1992). The main policy and planning in this plan can be summarized as follows:

- To promote research and development to meet the needs of the country in solving problems, both in the short term and long term.

Research in social sciences and humanities are also taken into consideration. NRCT recommends the establishment of an institute responsible for specific programs in the field of agroindustry, nature conservation, biodiversity, and ecology for sustainable development.

- To improve R & D capabilities to conduct good research. More researchers both in the state and private sectors are encouraged. Infrastructure in funding arrangements, equipments, laboratory facilities, work conditions, and incentives are pointed out.
- To develop cooperative research programs among state agencies as well as between the state and private sectors in order to promote agricultural technologies and avoid overlapping in research and stimulate more social justice, NRCT recommends research for more value-added farm products and reducing use of chemicals in farm production.
- To promote cooperation and exchange of information with other foreign agencies. NRCT suggests the development of an agricultural information base to benefit farmers.
- To promote any research which will eventually benefit the country with special emphasis on practical research in solving farmer poverty, low price of farm products, and efficient use of farm area. Promotion of genetic engineering research for better improvement of crops and animal husbandry was suggested.

CONSTRAINTS IN FORESTRY R & D

Following the drafting of the research plan, the NRCT Committee on Agriculture and Biology appointed a Sub-Committee on Forestry Research to work on guidelines, constraints, and recommendations related to forestry research. Many researchers were not satisfied with the research conducted in the past. They stressed the importance of revising policy, improving public relations, improving the coordinating roles, and improving cooperation with other agencies. The private sector should be encouraged to do more research. The main issues were reported by Bhumibhamon et al. (1989a), as follows:

- Problems on land use are enormous. There has been depletion of

forest resources at an annual rate of 0.5 million hectares during 1960-1988, to 0.3 million hectare in 1991. Today, about one million families occupy degraded forest land for settlement and farming. Thai society believes that different forms of community forestry systems should be developed. State enterprises and NGOs also agree in promoting community forestry programs so that people should share the responsibility in protecting and developing forest resources.

- People lack interest to protect the forest as it has been perceived as common property. Over-exploitation of forest resources indicates people's interest to use more wood to satisfy needs. Additionally, more people need more land for farming and settlement. In conclusion, over-exploitation of forest resources has caused more wood shortage and soil erosion.
- Exports of wood and wood products decreased tremendously during the last decades. During 1900-1960, wood and wood products were the main export products after rice. Over-cutting of forest resources has disturbed the existing growing stock and gene pool. Today, wood and wood products are ranked 20th among the export items.
- The closing down of concession areas has disturbed the forest management system, the manpower related to tree harvesting, the employment of elephants at work, and the livelihood of trained workers in the sawmilling sector. Most wood industrialists in Thailand pay little attention to forestry research. The closing down of concession areas still opens possibilities for illegal logging. Without logging control, the state loses payable taxes or fees. Authorities at the regional, provincial, and district levels lack interest to control the remaining forest resources except in the case of the protected forests.
- The public needs more protected forest to ensure their well-being. Some of the undisturbed concession areas have been converted to protected forest. Protected forests consists of national parks, wildlife sanctuaries, and nature parks. As the tourism industry is well-developed in the country, researchers have suggested a stronger role for nature conservation and recreation in the protected forests.
- Water shortages in 68 out of 73 provinces have emphasised the importance of rehabilitating the watershed areas. The watershed

classification will be completed in 1992. Integrated management practices were tried in some watershed projects. Research on resettlement or land uses in the watershed areas is urgent.

- Tree planting has been conducted by state agencies for almost 90 years. There were 72 native species and 27 exotic species selected for planting. State enterprises also participate in tree planting but face the problems of land availability for planting and legal status of materials planted. Tree improvement has been developed with teak, pine, and some fast-growing multipurpose trees. Researchers suggest the use of improved materials for planting. Industrial plantations were encouraged during 1980-1990 and were suspended since 1990. However, small scale tree farming, with or without agroforestry practices are still promoted. Researchers recommended research on improved materials, fertilizer application, planting techniques, utilization of small size trees, improving the value-added of wood materials, agroforestry, and on-farm research.
- Coastal zone and mangrove forest has been subjected to conversion for settlement and establishment of aquaculture systems. The conversion of this forest has tremendously disturbed the food chain of living organisms in this ecosystem. Also, people who live next to the mangrove forests are facing shortages of fuelwood for cooking and house construction. Control systems for this ecotype are not effective at the moment.

FORESTRY EDUCATION

As mentioned earlier, forestry education in Thailand began with personnel trained abroad. The forestry school was established in Phrae in 1936 and was attached to the Royal Forest Department. In 1944 it was joined with Kasetsart University where a 5-year undergraduate degree program was offered. Later, in 1969, the course was reduced to 4 years. Master and Doctor degrees were offered in 1967 and 1991 respectively.

The Faculty of Forestry, Kasetsart University (KUFF) still remains the only forestry higher educational institute in the country. To meet the needs for manpower development, other institutions offer some forestry and related subjects in the undergraduate program. Sukhothai Thammathirat University (STU), which is an open university, offers a degree in social forestry for forest technicians and those who hold other degrees in science.

Other institutions offer specific degree programs in forestry. Chiangmai University, Faculty of Agriculture (CMUFA), offers an agroforestry program and has started to develop a department of forest resources to conduct research related to forestry. CMUFA also offers a special Master degree course in English on farming systems for Thai and foreign students. Maejo Institute of Agricultural Technology, Faculty of Agricultural Products (MIATFAP) gives some lectures on agroforestry and community forestry. Khon Khaen University, Faculty of Agriculture (KKUFA) offers a few courses in community forestry. With support from the Ford Foundation, the university has started a special English graduate program in community forestry. Students from Thailand and Indochina are the main target groups. In the South, Prince of Songkla University, Faculty of Natural Resources (PSUFNR) offers a course in wildlife biology. A Master's program in agroforestry will be started soon.

KUFF has 64 members of staff of whom 31 are PhD and 31 are MSc holders. The Phrae Forestry School has 1 PhD, 6 MSc and 24 BSc holders among its staff.

At KUFF, the annual student admission was 120 during 1973-1977. It was increased to 150 students during 1977-1980. Since then, the annual student admission has been set at 170 students. Generally, the number of registered students was 85%. The curriculum has been revised several times to meet the needs of the country. The new curriculum (1992) provides three majors for selection, including forest resources (7 options: forest management, forest biology, forest engineering, watershed management, wildlife management, recreation, and range management) forest products, and social forestry. The new curriculum offers more opportunity to work on plantation forestry, biodiversity and protection of conserved forest, and people-oriented forestry programs.

Generally, students at the BSc level conduct small research projects on selected key areas. Master and PhD theses are well-prepared and provide much important information. Grants from donors to carry out the research for the young scientists is essential. Research can be conducted at the university, Royal Forest Department or other research agencies.

Students in Phrae Forestry School are trained as forest technicians. They are ready to work as research assistants and can implement tree measurement, plus-tree selection, germplasm collection, nursery techniques, wildlife inventory, wood testing, etc. The school will be closed down in 1994. The forestry training programme will be in the hand of KUFF.

NATIONAL FORESTRY RESEARCH

Among ASEAN countries, Brunei and Thailand have no national forest research institute. When the National Forest Policy was presented to the cabinet for approval on 3 December 1985, a National Forest Research Institute was mooted, to conduct forestry research and development to meet the needs of the country. However, the cabinet suggested that the Royal Forest Department should seek cooperation from universities and other higher institutions in conducting basic and applied research.

Up to now, forestry research has not recieved high recognition and the practical application of research findings is relatively weak. Technology transfer in forestry is not active. The state of public relations is poor. Information commonly appearing in the mass media deal mainly with illegal logging, land encroachment, land allocation, flood, drought, and tree planting by state agencies, NGOs, and the community.

THE POSSIBLE ROLE OF FOREST SCIENTISTS

One of the main reasons why graduates have produced little of use in forestry research is the manpower structure. Often, the Royal Forest Department, as the main organization, does not pay attention to proper deployment of new staff. For example, a graduate in wood technology may be placed in plantation establishment. The manpower structure does not permit any flexibility.

In a review of forest scientists in Thailand, Bhumibhamon (1989b) listed the level of their job-satisfaction as follows:

Highly satisfied	5.9 %
Satisfied	41.2 %
A little satisfied	47.0 %
No comment	5.9 %

The scientists listed their problems as follows:

1. Lack of research funds.
2. Lack of cooperation; most researchers work on their own.
3. Improvement in regulations required, particularly in budget allocation.
4. Researchers do not fully participate in research, often they have to spend time on other activities.
5. Lack of dissemination of research results. The practical application of

research results is still low. Most research conducted at present has little benefit for industrial use.

6. Agencies pay little attention to research and also take little notice of available research results.

It is recommended that the scientific climate should be improved and the promotion system should be better based on capability in research. Research priorities should be set up and extension services improved for dissemination of research results.

TRAINING

Besides the normal education system, training in specific research areas is recommended, based on national, regional, and international programs.

National

During 1987-1991, The Royal Forest Department ran 77 training courses in which 8683 trainees participated. Fields of training were forest administration (10 courses, 2718 trainees) forest protection and conservation (22 courses, 4015 trainees) forest research and development (22 courses, 1432 trainees) forestry extension (4 courses, 259 trainees), and others (19 courses, 259 trainees).

The Forest Industry Organization (FIO) has also started to develop an in-service training program. In 1991, 18 courses were arranged and 1599 trainees participated. These training courses were new official orientation (1 course, 18 trainees), forest industry administration (7 courses, 512 trainees), value added tax (1 course, 130 trainees), forest plantation management (2 courses, 82 trainees) rubber tree plantation establishment and management (4 courses, 785 trainees) wood processing development (2 courses, 41 trainees), and charcoal production (1 course, 31 trainees).

There are also courses provided by the National SubCommittee on Research and Development of Multipurpose Trees, NRCT, in cooperation with F/FRED, including how to prepare a research proposal, data interpretation, and analysis. A course on how to prepare research papers will be conducted in December 1992.

Regional

A great number of courses have been conducted by the Food and Agriculture Organization, International Foundation for Science, F/FRED, BIOTROP, ASEAN-Canada Forestry Seed Center, FORSPA, Ford

Foundation, ESCAP, UNEP, ITTO.

ADB, the Government of Switzerland, and the Thai Government have set up the Regional Community Forestry Training Center for the Asia and Pacific Region. The courses last for 6 months, during June-November.

International

Training programs at the international level require more inputs and effort. FAO, UNEP, UNDP, IUFRO, World Bank, and ICRAF, are the main international agencies which have sponsored Thai participants. We expect that the new Center for International Forestry Research (CIFOR) will become one of the main international centers for training forestry research and development.

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TRAINING AND DEVELOPMENT OF SCIENTISTS FOR FORESTRY RESEARCH IN THE U.S.A.

by

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Abstract.

The universities and the US Forest Service together are responsible for 40% of all forestry research in the US. There are 45 universities granting professional degrees in forestry. University research is carried out mainly by graduate students under the supervision of a major professor. Within the US Forest Service, two-thirds of the 700 scientists are not foresters; among them are graduates in physics, botany, economics, social science, etc., covering a total of 33 disciplines. 67% of the scientists have PhDs and virtually all newly-hired scientists have a PhD. Scientists are provided with a range of training opportunities throughout their careers, to enable them to keep up with new technologies and adjust to new job requirements.

INTRODUCTION

The training and development of scientists for forestry research in the United States is strongly affected by the type of forestry research system and educational system that has developed in the United States, the particular training needs arising from the scientist's job assignments, and by the changing nature of forestry research in the U.S. In our discussion we will:

- briefly describe the forestry research system of the United States
- review some of the special characteristics of this system that affect the training and development of scientists for forestry research
- highlight the current status of training and development of forestry research scientists in U.S. universities and the U.S. Department of Agriculture, Forest Service, and
- look briefly at a few emerging trends in forestry research that may

affect future training needs.

Much of our discussion will focus on training and development as it relates to universities and the U.S. Department of Agriculture Forest Service (hereafter referred to as the Forest Service), which together account for a large part of publicly supported forestry research in the U.S.

THE FORESTRY RESEARCH SYSTEM OF THE U.S.

The types of forestry research being conducted in a country, and the types of organizations within which that research is being done, influence the training and development of scientists to carry out that research. To put our discussion of forestry research training in the U.S. in perspective, we will review the forestry research system in the country.

Traditionally, we tend to think of forestry research as that research which is carried out by organizations designated as forestry research organizations. In this sense, research conducted by the U.S. Forest Service is considered to be forestry research, as is research conducted by a forestry school in a university. However, we all recognize that considerable research on forest and related ecosystems, and on human uses of forests and related natural resources, is carried out by individuals and organizations outside of the traditional forestry research organizations. This, too, can be considered forestry research. Many nonforestry departments of universities conduct research directly related to forestry; for example, research on forest ecosystems may be conducted by a department of ecology, research on soil microorganisms by a soils department, research on forest recreation activities by a department of outdoor recreation, to name only a few. Many nonforestry organizations conduct research that is directly related to forestry research; for example the Fish & Wildlife Service, the National Park Service, the Bureau of Land Management, the Department of Energy, the Environmental Protection Agency, and many other federal and state agencies support and conduct research related to forests and their uses.

Because the missions of the organizations and institutions that conduct forestry research in the U.S. vary, different types of training and development may be appropriate for the scientists conducting forestry research within the different institutions. In this discussion we focus our attention on two important nonindustrial forestry research institutions: forestry schools (including forestry departments and colleges) within universities, and the Forest Service. Together, these two institutions are

responsible for approximately 40 percent of all forestry and forest products research in the U.S., and for perhaps 80 percent of non-industrial forestry research (Buckman 1985).

Forestry research in universities

The university system of the U.S. is composed of a diverse group of public and private institutions for higher education. Only some of these have colleges, schools, or departments with degree programs in forestry and with formal programs of research on forestry and related subjects. Currently there are 45 educational institutions in the U.S. granting a professional degree in forestry at the bachelor's or master's level with a forestry curricula accredited by the Society of American Foresters (Smith 1992). Forestry faculty and graduate students at these accredited institutions conduct a substantial amount of forestry research. Much of this research is carried out by graduate students under the supervision of a major professor.

In addition to these accredited institutions, many other colleges and universities have curricula related to forestry and related natural resources. Faculty members from these institutions conduct research that often is directly related to forestry, and they educate and train scientists who eventually may engage in forestry research.

For example, within the state of Minnesota the University of Minnesota, a public institution funded primarily by the state government, has a College of Natural Resources. The College has a formal program of forestry education, fully accredited by the Society of American Foresters (Smith 1992), and maintains a large program of forestry research. Yet other nonaccredited educational institutions within the state teach courses related to the management and use of forest resources, and their faculty engage in forestry-related research in the physical, biological, and social sciences.

Many of the forestry schools are located in what are termed Land Grant Universities, which were established by state governments utilizing income derived from the sale and use of land granted to the states by the federal government for this purpose. Land Grant Universities were designed to be a bridge between scientific discovery and application to practical problems. To carry out this design, faculty members of these institutions, particularly in such applied fields as agriculture and forestry, have divided responsibilities and joint appointments in teaching, research, and extension (the dissemination of research results to the ultimate user and assisting in its adoption). Most faculty members can devote only part

of their time to research, due to their other responsibilities.

Funding for forestry research within universities comes from a variety of federal, state, and private sources. According to the National Research Council (1990), federal sources provided roughly one-third of the annual expenditures on forestry research at universities in 1988, with the remaining two-thirds being provided by non-federal sources, primarily state governments.

Because university funding for forestry research is relatively low compared to research support in other sectors (National Research Council 1990), faculty members in U.S. universities actively seek outside funding from federal or state agencies, private foundations, or other sources to support their programs of forestry research. They may respond to requests for proposals that come to their attention, or personally contact potential funding sources for research. Such funding rarely is given without some constraints as to the nature and object of the proposed research. The availability of funding to support forestry research influences the direction and content of forestry research programs in universities. This, in turn, influences the type of training in research that can be provided to young scientists, and the financial aid that can be extended to them. For many graduate students, the subject matter area of their dissertations, and therefore the type of research experience they receive, may be strongly influenced by the particular funding that is available to support their work.

Forestry research in the USDA Forest Service

Most of the forestry research within the U.S. government is conducted by the Forest Service within the U.S. Department of Agriculture (USDA). Within the Forest Service, research programs are administered by a Deputy Chief for Research. At the present time there are eight forest and range experiment stations, each covering a broad geographic region of the United States, and one forest product laboratory with a national mission. Each experiment station is administered by a director and a small staff of assistant directors. Each of the forest and range experiment stations conducts research at a number of field laboratories, often located on campuses of major universities. In fiscal year 1991, the Forest Service had over 700 scientists conducting or participating in over 2,800 studies at 74 locations worldwide (USDA Forest Service 1992).

Each of the experiment stations is responsible for a broad range of forestry research programs related to their geographic area of responsibility. Forest Service research programs are funded under five broad research areas: forest protection, resource analysis, forest

management, forest environment, and forest products and harvesting. Fiscal year 1991 appropriations for Forest Service research totalled approximately \$168 million, with additional funding from other government agencies and various private sector institutions of \$3 million (USDA Forest Service 1992). Of this total Forest Service budget for research, \$19 million supported cooperative studies with colleges, universities, industry, and other domestic and international organizations.

The research of the Forest Service is conducted by small groups of scientists organized into Research Work Units, under the direction of a senior scientist designated as a Project Leader. Thus, many senior scientists within the Forest Service have supervisory and administrative responsibilities in addition to their scientific research responsibilities. This has implications for both training and development.

Since 1980, the number of funded scientists in the USFS has decreased substantially, dropping from 964 in 1980 to 716 in 1990. However, during this same period the number of research scientists with PhDs increased from 434 in 1980 (45 percent) to 479 in 1990 (67 percent) (USDA Forest Service 1991). During the late 1950's many young scientists entering the Forest Service were hired with a masters-level degree, perhaps in the process of completing a PhD degree. At that time, considerable attention in training was given to assisting young scientists in obtaining advanced graduate education to improve their research capabilities. Today the situation is far different, with roughly two-thirds of the scientists having PhDs, and virtually all newly hired scientists possessing a PhD. Now, a considerable amount of the formal training effort within the Forest Service is devoted to improving the supervisory and administrative skills of scientists.

Within the Forest Service, scientists generally have two career tracks available to them: 1) they can remain as a research scientist, or 2) they can move into research administration. Both career tracks have ample chances for promotion, but the basis for promotion differs between them. Promotions of research scientists are based on their research accomplishments and status among their peers, while promotions of administrators are based upon their administrative assignments and abilities. However, as research scientists gain experience and reputation, they may be placed in charge of technicians and/or other scientists, and be given supervisory and administrative duties in addition to their research work. The Forest Service recognizes that most scientists have not had the training necessary for supervisory and administrative responsibilities, and has an active program to provide such training to scientists who show

promise of taking research leadership positions.

FACTORS INFLUENCING THE TRAINING OF SCIENTISTS FOR FORESTRY RESEARCH

A number of factors influence the training of scientists for forestry research. Some of those of particular importance to the training of forestry researchers in the U.S. are addressed here.

Diversity of funding sources for forestry research

Within the United States, forestry research is funded from a variety of sources, including various agencies and programs in the federal and state governments, private industry, private foundations, international agencies, and other sources. Within any one institution conducting forestry research, funding may come from a variety of sources, most of which may be earmarked for particular programs of research. As programs and missions of funding agencies and organizations change over time, the research activities funded by those organizations change, and the need for particular types of training changes. Changes in funding priorities often force changes in research program activities, leading to training to acquire new knowledge and skills required by the new research directions.

Diversity of organizations conducting research related to forestry

As described earlier, research related to forestry is conducted not only by forestry research organizations, but also by researchers in many organizations not traditionally considered part of the forestry research community. Because these various institutions derive their research support from a variety of sources, their programs of research vary considerably, ranging from research emphasizing commodity values of forests, such as timber production, to research emphasizing noncommodity values, such as biological diversity and protection of endangered species. Thus, in considering the training and development of scientists for forestry research, consideration should be given also to those scientists who conduct forestry research within nonforestry research organizations.

Diversity of scientific disciplines working on forestry problems

One important factor affecting training and development of scientists for forestry research is the diversity of scientific disciplines represented in forestry research in many U.S. organizations. Gone are the days when most forestry researchers were trained in forestry as such. Today, a wide

range of disciplines are represented in an organization such as the Forest Service. For example, in fiscal year 1990, the Forest Service reported a total of 629 onboard research scientists (research professional, grade GS-11 and above, that are responsible for independent scientific study, as demonstrated through originality, judgment, and accomplishment, and directly assigned to a research work unit) (USDA Forest Service 1991). This group of scientists represent 33 disciplines, ranging from chemists and physicists, to botanists and ecologists, to economists and social scientists. Only one-third of these scientists were classified as foresters. Two-thirds of the research scientists within the Forest Service have nonforestry classifications. The academic training that produced this group of scientists within one forestry research organization was obviously obtained from many different academic traditions, from many different universities throughout the country. This diversity of scientific background is likely to become even more pronounced over time within public forestry research organizations that have a mission of applied research in the management and use of forests and related natural resources.

Increasing need to address forestry problems through interdisciplinary research

Many of the important problems in forestry research involve studying the varied and often conflicting uses of complex forest and related ecosystems. Developing an understanding of the components and processes at work within forest ecosystems may require a number of scientific disciplines in the physical and biological sciences. Understanding the economic and social consequences of different patterns and intensities of human use requires the efforts of various social sciences. In many cases, it may be necessary to develop interdisciplinary teams of scientists. Rarely does the scientific training of a scientist encompass the special problems of learning to work effectively with scientists from diverse disciplines. It may be necessary to develop special training to enable scientists to work with other disciplines as members of an interacting team.

Research partnerships between universities and the USDA Forest Service

Many research programs and projects in the Forest Service are carried out in close partnership with scientists from universities and colleges. As part of their program of research, Forest Service Research Work Units often contract with universities to carry out specific studies. In many of these studies, Forest Service personnel may be directly involved as co-investigators, and assist in field or laboratory work, in data collection,

analysis, and evaluation, and in publishing the results. Research staff at Forest Service field locations often have appointments on the faculty of colleges and universities in the area. Many staff take advantage of locations on university or college campuses to continue their education, sometimes as part of their ongoing work assignment and sometimes on their own initiative. This close, interactive association between Forest Service and university researchers can enhance the research capabilities of each. This partnership exists not only between the Forest Service research stations and forestry schools and colleges at universities, but between many other departments within universities as well.

CURRENT STATUS OF TRAINING AND DEVELOPMENT OF SCIENTISTS IN THE U.S.

Education and training of scientists within universities

Although many institutions of higher education in the U.S. offer training and education in areas closely related to forestry and the management of renewable natural resources, our remarks will concentrate on the education and training of scientists within the forestry institutions accredited by the Society of American Foresters.

From 1984 to 1988, universities in the United States granted an average of 98 PhDs each year in forestry (National Research Council 1990). U.S. universities play an important role in the training of scientists for conducting forestry research in other countries. For example, of the 106 forestry PhDs awarded in 1988, 24 were awarded to citizens of other countries with temporary residency status.

Approximately half of the new PhDs in the forest sciences each year are employed by universities. During the 1980s, the number of scientists in the Forest Service declined substantially, greatly reducing the job market for scientists within the Forest Service.

Few forestry schools require a rigid set of courses that must be completed to obtain a graduate degree in forestry. Much graduate student education in U.S. forestry schools takes place in departments outside the forestry school. Exposure to a diversity of academic disciplines and faculty is the rule. Thus, much education and some training, particularly in the use of advanced technologies, takes place outside the forestry curricula. Typically, there is considerable flexibility in designing programs to meet individual needs. For example, at the University of Minnesota there is no standardized set of subject matter qualifications for a PhD in forestry. However, the student and faculty advisor must develop a program of

coursework that meets the basic requirements of the Graduate School of the University, and is acceptable to the advisor, the student's degree committee, and the Department of Forest Resources. This flexibility in developing special programs of study to meet the particular needs of the student is necessary to meet the changing mix of students entering into forestry programs, and the changing employment market for those with forestry degrees. There is an increasing trend for graduate students to enter forestry schools from other fields. Many lack basic knowledge and field experience of forestry, and may need to take courses in forestry and in the physical and biological sciences in order to acquire the basic knowledge and skills necessary to work effectively in forestry.

Graduate students in some U.S. forestry schools may be exposed to a course in scientific methods during the course of their education. However, students in some schools may have little opportunity to obtain a formal course in the methodology of science. When such courses are taught, the content is highly variable, and usually reflects the instructor's view of how science is done and what is important for students to learn. For most graduate students, training in the conduct of scientific research is obtained through the actual doing of a research project under the direction of a major professor, a master-apprentice type of relationship, rather than from any formal course work. This type of training for scientific research is highly variable, depending upon the research knowledge, skills, and experience of the major professor.

External funding dictates research areas and problems. Within most forestry schools in the U.S., internal funding to support graduate research assistantships or to conduct research is limited. Much of the financial support for forestry research must come from outside sources and be obtained by individual faculty members.

University scientists engaged in forestry research generally have opportunities for the continued development of their careers. They maintain and develop contacts with their peers, join professional organizations, attend workshops, conferences, and other meetings related to their research, and engage in cooperative research projects that involve working with other researchers and land managers. They have access to literature in their fields, and maintain contacts with a wide range of non-forestry professionals both inside and outside of universities. Many consult with private and government agencies on a regular basis, thereby becoming more familiar with forestry and related operations on the ground. Most are able to keep abreast of the latest developments in their respective fields in order to incorporate this information, knowledge, and technologies into

their teaching.

Training of scientists for forestry research within the USDA Forest Service

The training needs of scientists conducting forestry research within the Forest Service vary throughout their careers. As a scientist develops and gains experience and capabilities, and as job assignments change, the types of training needed to improve the scientist's effectiveness in research changes. At the risk of oversimplifying, one can outline the following training needs at different stages in a scientist's career in forestry research:

- **Sound academic training in specific scientific disciplines.** In order to qualify as a research scientist one must acquire the knowledge and skills in some scientific discipline. The specialized academic training necessary for conducting scientific research is imparted at the graduate level, particularly through the PhD degree. Universities in the U.S. traditionally have provided a wide range of graduate programs in forestry and other related fields of natural resource management, together with strong graduate programs in the more basic sciences and technologies that include research related to forestry.
- **Entry-level on-the-job training.** A scientist hired by the Forest Service undergoes training in administrative procedures and an orientation to the entire Forest Service, as well as training in specific work practices and procedures and the use of special equipment required in the field of work to which they have been assigned. Special training may be required to impart the knowledge and/or skills required for work assignments that extend beyond the expertise of the employee. A special, and perhaps most important, part of on-the-job training of young scientists is the opportunity to work closely with mature scientists. Scientific research is more of an art than a skill, and one that can be conveyed most successfully through a master/apprentice relationship, where a senior research scientist works closely with a junior scientist, and becomes his or her mentor.

As an indication of the importance attached to this type of training, some Forest Service experiment stations have developed formal mentoring programs (for all types of employees - not just scientists), which include training for those who become mentors. This type of early on-the-job training may be one of the most important types of training for a successful scientific career. In practice, however,

the results are often highly variable, depending upon the particular circumstances and situation of the job location. For example, scientists in a particular discipline may find themselves working at small field laboratories with no peers in their discipline with whom they can work and interact.

- **Continuing development of scientific capabilities.** If scientists are to continue developing their capabilities for scientific research, they must have access to the scientific community in their field. Contact with the literature and with other scientists is necessary to keep up with the new discoveries that are being made, the new knowledge that is accumulating, and the new technologies being developed to improve research methods in their fields. Some of this may include formal training activities such as attending short courses and workshops, or taking additional course work in specialized subjects at colleges and universities as needed. Additional formal training will be especially important when a scientist is reassigned to a new area of research. Developing contacts with other scientists - becoming a member of so-called "invisible colleges" - can help immensely in the continued development of scientists. Becoming active members of scientific organizations can help in the professional development of scientists.

Fortunately, most scientists within the Forest Service have access to this type of continuing development, with access to well-equipped libraries, membership in professional organizations, and funding to permit travel to selected workshops, symposia, and meetings. They also enjoy the support of high-level administrators who encourage continued development of their scientific capabilities, and provide opportunities for continued training, subject, of course, to the availability of funding.

- **Development of supervisory and administrative skills.** As scientists develop in their profession, and become more successful in their research activities, they are likely to be assigned supervisory responsibilities and administrative duties within the Forest Service research organization. Up to this point, the training of scientists for forestry research will have focused on developing scientific expertise in conducting research, generally within some specific discipline. Most scientists will have had little training in how to supervise and manage people, and little experience upon which to draw. The Forest Service places a strong emphasis on this type of training, and for some positions requires a certain minimum level of training. It provides

opportunities for research scientists who advance in supervisory and administrative responsibilities to attend formal training courses to obtain this training. For example, a two-week "Research Management Seminar" is taught every year for new and prospective research project leaders. This course deals with such topics as research administration, budgets, planning, and policy. Most of the top level administrative assignments within the Forest Service research organization are filled from the ranks of qualified scientists. As scientists advance in administrative responsibilities, additional courses in management principles and practices are required.

- **Mid-career training.** Many scientists at the midpoint in their careers, after 15-20 years in their respective fields, are faced with the realization that their knowledge and/or training is becoming obsolete and out of date in their field. At this point in a scientific career, a scientist who wishes to continue in research may have to consider the need for additional training to be brought up to date in their field of science. A few scientists may wish to go even further, and obtain enough training to be able to branch out into new research directions, or even into an entirely new field of science. Some scientists recognize the need for, and actively seek, this mid-career training. Other scientists may be perfectly content to continue doing their research, just as they always have done, for the remainder of their career. At times, research administrators may have to encourage the use of mid-career training for some individual scientists who are not working up to their capabilities.

Research administrators at most Forest Service experiment stations have recognized the need for mid-career training, and have encouraged its use. They have successfully urged scientists to participate in such training activities. The type of training undertaken can be quite varied. For some scientists it may take the form of a sabbatical leave to gain new experiences. For others, it may be a temporary assignment to another job in a different organization to obtain a new perspective. For still others, it may be the opportunity for an extended period of travel and a chance to visit other scientific organizations to obtain new insights into potential scientific problems and approaches. A variety of approaches to this type of career-renewal training have been approved by research administrators.

- **Acquiring skills in using new technologies effectively.** Throughout a

scientific career, scientists are faced with the need to acquire new skills in order to be able to use new technologies that become available for use in research. A good example is the rapid expansion in the use of computers in scientific research. Acquiring the skills necessary to effectively utilize the many different computer software programs available for storing, analyzing, and processing data and information may require a substantial amount of training. It may be necessary to provide special training programs in the use of computers to scientists and support staff, and provide personalized instruction in some cases. This type of training is encouraged, funded, and in some cases conducted by the Forest Service.

EMERGING TRENDS IN FORESTRY RESEARCH AND THEIR EFFECTS ON TRAINING

Forestry research is not a static field of science. New problems continue to emerge as an increasing population, changing social values, and technological development brings more pressures to bear upon the resource. These emerging problems create some special difficulties for forestry research, some of which are described briefly below.

Identifying emerging issues

If research is to be effective, it must provide information needed to solve the problems that exist after the research has been completed and the results are available. Many research projects in forestry may take several years to complete. Such projects must anticipate problems and allow for a suitable lead time. Further, forestry research may require scientists with special training and skills. This, too, must be anticipated in advance so that education and training of scientists can take place to make them available when needed. One approach to dealing with this difficult problem of lead time in forestry research is to identify emerging issues sufficiently far in advance to plan for training of scientists to acquire the necessary knowledge and skills, and to plan and budget for the research studies needed to address the problem. Efforts to identify emerging issues have been undertaken in the U.S. during the past few years.

A recent study identified critical issues that were likely to emerge during the next 10-15 years in the management and use of the national forests in the United States (Gregersen et al. 1989). The study found widespread agreement among managers at different levels within the USFS as to the relative importance of emerging issues. The study suggested the

need to redirect future forestry research programs towards more social science research. Few of the most critical issues identified related to technical aspects of forest management and use; most related to people problems. Four out of five of the most important issues dealt with problems in resolving conflicts among people regarding the management and uses of national forest lands. Thus, learning how to better manage land use conflicts is an important subject for future research.

Similar studies have been made or are underway to identify emerging critical issues in the management and use of the nation's national parks and the Bureau of Land Management lands as a means of identifying critical research needs.

New directions in research

Much of forestry research in the past focused on physical and biological research on forest ecosystems managed for the production of timber. Currently, there is an increasing emphasis on social science research as a means of coping with increasing problems of human systems interacting with forests.

This is reflected in a new research strategy for the 90's developed by the USDA Forest Service (USDA Forest Service 1990). The Forest Service has divided its research program into three major components:

- 1 **Understanding ecosystems.** This includes ecological processes, biological diversity, endangered species, global change, atmospheric deposition, surface and ground water pollution, reforestation, and tropical forestry.
- 2 **Understanding people and natural resource relationships.** This includes socioeconomic aspects of wildland/urban interface, rural development and diversification, international trade, customer satisfaction, user group value differences, and influence of urban culture on natural resource management.
- 3 **Understanding and expanding resource options.** This includes systems and practices suitable for the production and use of natural resources, with increasing emphasis on water, fish, wildlife, and recreation, and extending the use of wood as a raw material, including recycling.

There also is an increasing emphasis on the need for interdisciplinary research to solve complex problems of the real world. Problems of global

warming, atmospheric deposition, and protection of endangered species and ecosystems, for example, will require the coordinated research efforts of scientists from the physical, biological, and social sciences.

Increasing cost of new technologies forces specialization in research

The increasing cost of obtaining, maintaining, and using new technologies, such as GIS capabilities, prototype forest products manufacturing facilities, field instrumentation for ecological monitoring, etc. will force universities and other forestry research organizations to specialize. This, then, would lead to different training needs and opportunities at locations.

Scientists quickly become obsolete because of rapid technological change
As new knowledge and technologies are introduced into the various fields of forestry research, older scientists who received their education and training based on earlier technologies may face the need for updating their education and acquiring new skills. For example, the use of computers is changing the way in which people are collecting, storing, analyzing and presenting data. In order to take advantage of this technology, older scientists need training in the use of computers. Computer users need to continue to learn how to use new computer software that becomes available. In the future, artificial intelligence applications in research and natural resource management may create a need for new training for scientists. Research administrators should anticipate emerging technologies and plan to meet the training needs that are likely to emerge if these technologies are adopted and utilized.

CONCLUSION

In this rapidly changing modern world there is an increasing need to enhance the capabilities of scientists conducting forestry research through various kinds of training programs. There is a need to expand the education and training of a new cadre of forestry researchers who can address in an integrated fashion the complex problems of developing and managing the sustainable human use of forest and related natural resources, while addressing local, national, and global environmental concerns. There is increasing recognition by U.S. universities that there is a need to enhance traditional discipline-oriented education by creating interdisciplinary approaches to education, including broadening forestry programs to include a wider range of subjects and disciplines, and the creation of new multi-disciplinary curricula, such as conservation biology.

Unfortunately, the capacity of universities to expand education and training programs is severely limited by reduced budgets. Forestry faculty at many universities already are overloaded in terms of advising graduate students, and must turn away promising candidates due to the lack of available advisors. Without a new source of funding to support an expanded training and educational program, there are serious doubts regarding the potential capacity of U.S. universities to meet their share of the expected training needs that are likely to arise if forestry research were to expand rapidly world-wide.

There also is the need to increase the managerial capabilities of those who manage and administer research programs in order to ensure the most effective use of the scarce human and capital resources available for forestry research. In an effort to make training in the management of forestry research more widely available, the authors, at the University of Minnesota and the Forest Service's North Central Forest Experiment Station, are collaborating with IUFRO/SPDC (International Union of Forestry Research Organization /Special Programme for Developing Countries), FAO, and ISNAR (International Service for National Agricultural Research), in preparing a set of self-study distance learning modules for forest research planning and management, based in part on FAO Forestry Paper 96 (Gregersen et al., 1990).

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FORESTRY RESEARCH NEEDS AND ACHIEVEMENTS IN THE ASIA-PACIFIC REGION

by

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Abstract

In order to promote understanding of shared problems in forestry and to explore common solutions, the Asian Development Bank, the UNDP, and FAO, have joined to fund and establish FORSPA (Forestry Research Support Programme for Asia and the Pacific). The objectives of FORSPA include (1) identifying the major forestry research problems of common concern to the developing countries of the region, (2) funding research projects to tackle those problems, (3) promoting sustained interaction among researchers through networking FRIs and task forces and (4) preparation and dissemination of research information.

Five priority areas have been identified for FORSPA support, namely (1) upland watershed management, (2) reforestation of degraded lands and problem soils, (3) ecosystem conservation and maintenance of biological diversity (4) improving the sustainability of plantation forestry and (5) promoting community participation in forestry development.

FORSPA organizes regional seminars and workshops and has a strong component for strengthening the research information system in the region.

Introduction

The Asia-Pacific Region, with 2,800 million people, is the home for half the world's population. The land area of the region is close to 3000 million ha. Agricultural land accounts for about 500 million ha., which is 30 percent of the world's arable land. Permanent pastures occupy 963 million ha, of which 90 percent occur in three countries: Australia, China and Mongolia. Forests and woodlands occur on some 650 million ha. and represent 16

percent of world's total in this category. Tropical forests, extending over 445 million ha, constitute a quarter of the world's resources of this kind.

As the 20th century draws to a close, developing countries of the Asia-Pacific Region face an unprecedented environmental crisis in the shape of forest destruction. In the last decade, the rate of deforestation more than doubled. About 4 million hectares of forest are stripped of vegetation every year to make way for human settlements and marginal agriculture. In several countries of the region, eroded water catchments are causing widespread adverse downstream effects, damaging arable lands and infrastructures. Fuelwood shortages are causing untold hardship to the rural poor, while the rapid decline in industrial wood supplies is crippling wood-based industries.

Given the above context, the region can move towards sustainable forestry development only by recognizing the realities of land use. Forestry development supported by forestry research and research extension should address the problems at the level of micro-watersheds, eroding hill slopes, mis-used arid and semi-arid lands and soils drained of nutrients.

Since the nexus, food-energy-environment, determines and impacts the survival strategies of house-holds and their aspirations, solutions should be socio-economically compatible, economically viable and ecologically sound.

Forestry research needs

There has been a substantial and significant increase in the reforestation efforts by the developing countries of this region in recent years. According to one estimate, current efforts exceed 3 million ha per year and the investment surpasses US \$ 1,000 million a year. However, the percentage of survivals and the productivity of plantations need to be improved. For these programmes to succeed a corresponding concerted increase in research inputs, technological back-up and extension at the grass root level are of pivotal importance.

Although development assistance in the forestry sector has expanded rapidly in the past few years, the total funding for forestry research in developing countries is only 5 percent. By comparison, the percentage of assistance allocated for agricultural research rose from around 4 percent during the 70's to about 10 percent in the 80's.

Forestry research needs are often not fulfilled because of the many constraints faced by national forest research organizations. Among them are:

- Little or no political support for forestry research within country

- Lack of funding stability from year to year
- Negligible interaction among researchers, users and potential users of research results
- Lack of "research extension" or transfer of research results to the field
- Low level of researcher training
- Poor library and information services
- Little interaction with other related research organizations within the country
- No coordination of research efforts among countries

The forestry research situation in some of the developing countries of the region is briefly reviewed here.

Bhutan

Forestry research in Bhutan is in its infancy. The Forest Research Division was established in 1987 under the Department of Forestry, Ministry of Agriculture and has a staff of 12. Five Regional Stations are planned to be established. Research studies on stem analysis, regeneration trials and species trials are in progress. Bhutan is just embarking on forest research and the data base is small.

People's Republic of China

The Chinese Academy of Forestry, rehabilitated in 1978, has 9 research institutes, 3 experimental bureaus and 1 centre for research analysis across 8 regions in China. Forestry Research Institutes attached to the Provincial Forestry Departments and forestry universities/colleges also carry out location specific research. The Research Institute of Forestry (RIF), is the largest amongst the institutes under the Academy. Currently RIF is undertaking 66 research projects which are national in character, often inter-regional and multidisciplinary. In China, funds for forestry research account for about 6 percent of the total outlay in forestry. The main impediments to forestry research are: (i) limited funds (ii) inadequate basic research and (iii) shortages of expert staff.

Fiji

Research divisions within the Ministry of Forests deal with tree breeding, the growth of fuelwood crops, agroforestry techniques and timber utilization research. Research is concentrated on biological problems of tree production. The main limitation is shortage of trained local staff.

India

The Indian Council of Forestry Research and Education (ICFRE) and its constituent institutes, the State Forest Departments, the Indian Council of Agricultural Research and the State Agricultural Universities carry out forestry and related research. ICFRE has six research institutes viz: Forest Research Institute, (Dehradun); Institute of Forest Genetics and Tree Breeding (Coimbatore); Institute of Wood Sciences and Technology, (Bangalore); Institute of Deciduous Forests, (Jabalpur); Institute of Arid Zone Forestry Research, (Jodhpur); and the institute of Rain and Moist Deciduous Forests, Jorhat.

In addition to the traditional FRIs, institutions concerned with social sciences, non-governmental organizations and private establishments are exhibiting a growing interest in forestry related research issues.

The problems of forestry research are: (i) weak research extension services (ii) low priority and inadequate allocation of resources for research extension (iii) lack of networking and linkages with State Forest Departments, NGOs and private sector resulting in an inadequate delivery system, preventing dissemination of research results to users.

Indonesia

The Agency for Forestry Research and Development (AFRD) under the Ministry of Forestry (MOF) is responsible for coordinating and supervising nationwide forestry research activities. The main research centres are the Forest Research and Development Centre (FRDC) and the Forest Products Research and Development Centre (FPRDC) both in Bogor, West Java. The regional research institutes are located in Pematang Siantar (North Jewabu), Samarinda (East Kalimantan) and Ujung Pandang (South Sulewesi). Research priority is given to: timber stand improvement; tree improvement; timber harvesting techniques; wood processing techniques; non-wood products; agro-forestry. The main limitations are: limited capital and operating funds; lack of infrastructure facilities; lack of trained staff; lack of coordination between the agency and other scientific authorities; and lack of delivery system.

Malaysia

Basically, four institutions in Malaysia carry out forestry research. These are: (i) Forest Research Institute Malaysia (FRIM), Kepong, (ii) Faculty of Forestry, University of Agriculture (UPM) Serdang, (iii) Forestry Department, Sabah, (iv) Forestry Department, Sarawak. FRIM's activities

are covered under ten research programmes. Three broad areas receive priority. These are: (i) Management and Silviculture of Natural Forests (ii) Management and Silviculture of Plantation of Tree Species (iii) and Downstream Processing and Utilization. The major problems of forestry research in Malaysia are: low policy support, lack of career development opportunities and high turn over of research workers.

Myanmar

The Forest Research Institute at Yezin is the primary institute responsible for research work in forestry. The Timber Corporation, Forestry Department and Agriculture Institute also have their own research units. Current research programmes cover at least eight major areas: forest management and silviculture, soil science and agroforestry, forest production, forest genetics and botany, timber processing, timber mechanics, wood anatomy, and minor forest products. Problems in forestry research relate to frequent transfer of research personnel, lack of trained manpower and a weak infrastructure for carrying out research and disseminating research results.

Nepal

The Department of Forests and Plant Research (DFPR) under the Ministry of Forest and Soil Conservation is responsible for forest research. Species and provenance trials are the main thrust of forestry research in Nepal. The main problem of forestry research in Nepal is uncoordinated activities scattered over several projects under various departments and institutions. The human resources for carrying out forestry research need to be strengthened.

Pakistan

The Pakistan Forest Institute (PFI) located in Peshawar conducts research in watershed management, tree-crop interactions, economics of fuelwood plantations on private lands, water requirement of trees, biomass production, and afforestation of arid and semi-arid lands. The major problems are: shortage of trained manpower; dearth of information systems; lack of coordination and interaction with end users of research,

Papua New Guinea

The Papua New Guinea Forest Research Institute (PNGFRI) was established in April 1989. Three other institutions: the Department of

Forestry (PNG University of Technology), Christensen Research Institute based at Madang, Madang Province, and the Woo Ecology Institute based at Marobe Province also carry out research. Research presently being carried out deal with timber stand improvement in logged over areas, exploration of biological diversity, plantation silviculture, agroforestry, tree improvement, wood preservation, wood structure and properties, utilization of rattan, efficiency of sawmilling, and insect pests and diseases. The most important problems faced by PNG FRI are shortage of trained manpower and finance and land tenure issues.

Philippines

Some 34 institutions are engaged in research relating to natural resources. Only a few are active in forestry research: Ecosystem Research and Development Bureau (ERDB), Forest Products Research and Development Institute (FPRDI), University of Philippines Los Banos - College of Forestry, and several other universities. Presently ERBD is concentrating its work on ecosystems protection, genetics, tree improvement, and protection and development of uplands. The FPRDI is mandated to undertake research to assist the forest based industries.

Sri Lanka

The Forest Department of Sri Lanka under the Ministry of Lands, Irrigation and Mahaweli Development is the key state institution responsible for forestry research. Currently the only functioning research unit is the Silviculture Research Branch. It is active in: selection of species, varieties and provenances; production, storage and testing of seeds; development and improvement of nursery and planting techniques; pest and disease control; silviculture and management practices; conservation and protection of environment. The problems of forestry research are: shortage of manpower, lack of career development opportunities and lack of linkages with other agencies.

Thailand

A Forest Research Institute not been established so far in Thailand. The Silviculture, Watershed Management, Community Forestry, Forestry Products and MFP Divisions at the Royal Forest Department and the Forest Industry Organization are engaged in some research work. The Faculty of Forestry of Kasetsart University conducts research into several aspects of forestry. There are two regional centres located in the Kasetsart

University: Forestry/Fuelwood Research and Development Project and the Regional Community Forestry Training Centre for Asia-Pacific. The ASEAN Canada Tree Seed Centre is engaged in a programme of long term research into tree seed issues. The fragmented nature of research efforts is hampering research extension work in the country.

Vietnam

The Forest Science Institute in its reorganized form is responsible for most of the research in the country. The Southern Forestry Research Station tackles the problems of the south. Vietnam is undergoing a rapid phase of transition to a more liberal economy, and a reorientation of forestry research is taking place.

Achievements

At least 120 research establishments in 14 countries of the Asia-Pacific region are engaged in research into various aspects of forestry. Of these, 19 institutions are full fledged research institutes or departments or specialized research bodies. The range of activities carried out by these institutions is extremely wide. Most of them deal with applied research in the fields of silviculture, mensuration, forest utilization, forest botany, forest entomology, forest pathology, plantation forestry, agroforestry, and tree improvement. Assessment of the properties and uses of timber and research into seasoning, treatment, wood working and basic processing is also carried out by several of these institutions. Some are also involved in research on pulp and paper. Some institutions house important herbaria and natural history museums.

The achievements of national FRIs may be gauged by the amount of published research. The F/FRED project conducted a survey in 1990 of research carried out and published in five countries: Bangladesh, Indonesia, Malaysia, Philippines and Thailand. They found that between 1976 and 1990 a total of 704 articles had been published which incorporated research findings, on one or other of 17 species.

A search of CABI abstracts for the period 1976-90 revealed that on some of the topics selected for FORSPA funding (watershed management, shifting cultivation, soils, bio-diversity, protected areas, community forestry, NWFP, policy and economics), there are some 2600 publications.

Hundreds of universities, located in Asia and abroad, award MSc and PhD degrees to students who carry out forestry research. Even in the fledgling forestry faculty of Sri Jayawardanapura in Sri Lanka, started in

1983, as many as 30 dissertations on forestry related subjects found academic acceptance during the period 1983 to 1990. However, dissemination of research results contained in university dissertations remains a neglected task.

Research results published in China and Japan (often in their respective languages) are numerous, but only some are abstracted in English.

Reorientation and Regional Cooperation

In 1981, the World Bank and FAO prepared a document "Forestry Research - a Time for Reappraisal", and presented it at the Kyoto Meeting of IUFRO. This document, endorsed by IUFRO, argued for reorientation of research priorities in favour of forestry for rural development. It stimulated new interest among the international community in funding forestry research proposals, and heightened national awareness on the need for strengthening their FRIs.

During the decade of the 1980s:

- the Asian Development Bank has supported research components in several of its community forestry programmes
- the Australian Centre for International Agricultural Research (ACIAR) has assisted in the use of Australian trees in developing countries
- the Canadian International Development Agency (CIDA) has supported research at the ASEAN/CANADA Tree Seed Centre in Thailand and the ASEAN Institute of Forestry Management in Malaysia
- Centre Technique Forestier Tropical (CTFT) has funded research on timber technology, seed collection, harvesting, etc.
- DANIDA has funded projects on forest genetics research
- The EEC has supported research in the utilization of rubber-wood
- FAO has executed such regional projects as Regional Wood Energy Development, Support to Watershed Management, Agroforestry Research Systems, and Tree Improvement and Propagation
- the Ford Foundation has funded many small projects locally
- the Forestry/Fuelwood Research and Development Project (F/FRED) has been developed and supported by USAID
- GTZ has assisted Fiji with extension forestry research
- the International Development Research Centre (IDRC) has established bamboo, rattan and palm networks
- the IUFRO/SPDC has promoted forest science in developing

countries

- ICRAF has promoted agroforestry research
- the Integrated Mountain Development (ICIMOD) has started playing an active role in watershed research in the Himalayas
- JICA has assisted some countries with research projects in forestry
- the Overseas Economic Cooperation Fund (OECF) of Japan has funded research projects on afforestation in India
- the Man and Biosphere Programme (MAB) of UNESCO has supported research on lowland Dipterocarp forests
- the Nitrogen Fixing Trees Association (NFTA) has established demonstration plots and promoted information exchange on NFTA
- New Zealand ODA has assisted the Pacific countries with research into reforestation etc.
- The Overseas Development Administration (ODA) of UK has established an international network of practitioners and researchers in social forestry
- UNDP has supported field projects on selected research issues
- USAID, in addition to funding F/FRED, has supported research in community forestry and environmental issues
- the World Bank funded several projects with research components

The FORSPA Initiative

At the regional level, notwithstanding the fact that the priorities of national FRIs are primarily to address national problems, there are issues and problems that are common to several member countries. These could be addressed more effectively through inter-country collaborative action and cooperation. The lack of a mechanism for exchange of information and experiences is hampering the progress of such collaborative research. In order to promote understanding of shared problems and to explore common solutions the Asian Development Bank, the UNDP, and FAO have funded and established the Forestry Research Support Programme for Asia and the Pacific (FORSPA) for a three year period: 1992-1994. FORSPA is executed by FAO. CAB International is providing the information services.

The objectives of FORSPA include:

- identifying major forestry research problems of common concern to the developing countries of the Asia-Pacific Region
- funding research projects to tackle these problems
- promoting sustained interaction among researchers through networking

FRIIs and task forces

- preparation and dissemination of research information

A small secretariat has been established in the FAO Regional Office for Asia and the Pacific (RAPA), Bangkok, headed by a Program Advisor to ensure coordination and networking.

Research Programmes eligible for FORSPA funding

Five priority research areas have been identified for FORSPA funding. These are: (i) upland watershed management, (ii) reforestation of degraded lands and problem soils, (iii) conservation of ecosystems and maintenance of biological diversity, (iv) improving the sustainability of plantation forestry, and (v) promotion of community participation in forestry development.

Topic I: Research on Upland Watershed Management

To understand the interdependence of forestry, agriculture and energy-related interventions in upland watersheds and to demonstrate land use options which would enable upland dwellers to practice sustainable land use while maintaining productivity and reducing erosion and downstream damage.

Topic II: Research into Reforestation of Degraded Lands and Problem Soils

To design more effective strategies and actions to increase the productivity of degraded lands and problem soils (e.g. saline/alkaline, acid sulphate, laterite; sandy soils; waterlogged areas; etc.) and to prevent the potential hazard of desertification.

Topic III: Research into Ecosystem Conservation and Maintenance of Biological Diversity

To improve the understanding of the structure and functioning of tropical forestry ecosystems and the value and role of wood and non-wood forest products in local and national economies.

Topic IV: Research into Improving the Sustainability of Plantation Forestry

To produce conclusive evidence of the impact of intensive plantation forestry and to enhance its sustainability.

Topic V: Research into Promoting Community Participation in Forestry Development

To determine the effectiveness and efficiency of alternative incentive mechanisms and other measures to stimulate local participation in tree growing and conservation activities.

Implementing Procedures for the Above Research Programmes

The mechanisms for seeking specific project proposals from individual participating research institutes, identifying the shared nature of the problems and the possible solutions would be determined during the implementation of the FORSPA.

Special Task Forces comprising researchers specialized in the above issues and drawn from the participating research institutes will be set up. Periodic meetings of such Task Forces will be convened by the Programme Advisor to:

- determine the nature of the shared problems;
- identify and exchange common features of the research methodology to be adopted;
- ensure sustained interaction among cooperating researchers to achieve complementarity of research efforts and monitoring mechanisms;
- share research findings and disseminate results to users.

Regional Seminars and Workshops

FORSPA will periodically organize Regional Seminars and Workshops of task forces on selected themes. Donor agencies funding research in the forestry sector will be invited to these meetings in order to strengthen cooperation and collaboration among donors.

Funding Participation at International Meetings

Attendance at international meetings by a selected number of scientists of participating research institutes will be funded upon request by FRIs.

Research Information System under FORSPA

The FORSPA Agreement provides for strengthening of the research information system. This component will be implemented by the Commonwealth Agriculture Bureau International (CABI).

Under the agreement, CABI will provide the following services to FRIs:

- CD ROM facility together with the required hardware will be installed at 10 selected FRIs.

- Training will be provided in the operation of CD ROM.
- Selected FRIs will be supplied updated CDs and bibliographic data bases (abstract, serials, reports, books, conference proceedings, etc.) in machine readable or printed form;
- Research monographs on selected topics will be prepared and published.
- An inventory of unpublished data and findings in respect of research already carried out will be prepared.
- The FORSPA newsletter will be published on a quarterly basis.
- Appropriate research findings will be repackaged and disseminated.

Maintaining links with International Research System

FORSPA will, as appropriate, forge links with forestry research networks funded by various donors, articulate the research needs of the Region at global and interregional fora, seek additional financial resources, and work towards sustaining the research efforts initiated during the first three year period of FORSPA.

Conclusion

With some significant exceptions, Forestry Research Institutes (FRIs) in the Asia Pacific countries have been a fairly neglected lot. The majority of them lack adequate finance, manpower, and managerial training.

In the last decade or so, several initiatives have been taken by donors at the international and regional levels to help forestry in the Asia-Pacific region. However, donor funds allocated to forestry are not always used effectively: projects often end before national institutions are capable of taking over and ensuring continuity. In the final analysis, the correct environment needs to be created to nurture scientific creativity, effectiveness and productivity. According to Masaru Ibuka, the founder of Sony Corporation:

"... Creativity comes from looking for the unexpected and stepping outside your own experience..."

One cannot expect highly innovative research from low placed research organizations staffed by researchers with little motivation, few career prospects and fewer opportunities to get out of narrow moulds and explore wider horizons. A truly effective "research institute", complete with all its needs, is an investment in itself and is a goal worth pursuing.

PROPOSITIONS POUR LE RENFORCEMENT DE LA RECHERCHE FORESTIERE EN AFRIQUE SUB- SAHARIENNE

par

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Abstract

The document divides Africa South of the Sahara into three main ecological zones: rain forest, dry savannahs, and cool high plateaux. This is followed by identification of forestry development and research priorities. Five priority areas are identified for research: genetic improvement, management of rain forest, agroforestry systems, people's participation and irrigated plantations.

The document advocates the adherence to the two principles of matching funding effort with real capacity of each country and filling the gap by developing strong links between national research institutions.

Finally the document advocates long-term funding commitments for forestry research.

Resumé

Le document divise l'Afrique au sud du Sahara en 3 zones écologiques principales: la forêt dense, les savanes sèches et les hauts plateaux frais. Ensuite le document identifie les priorités de développement et de recherche de la foresterie. Cinq domaines prioritaires sont identifiés en ce qui concerne la recherche: l'amélioration génétique, l'aménagement de la forêt dense, les systèmes agroforestiers, la participation des populations et les plantations forestières irriguées.

Le document préconise l'adhésion aux deux principes suivants: harmoniser les efforts de financement avec les capacités réelles de financement des pays et suppléer aux déficiences individuelles en forgeant des liens solides de coopérations entre les institutions

nationales de recherche forestière.

Enfin le document préconise des engagements de financement à long terme pour la recherche forestière.

INTRODUCTION

L'Afrique Sub-saharienne est considérée comme la plus belle collection de petits pays pauvres; 21 des 31 pays les moins développés du monde se trouvent en Afrique. Ce qui représente presque la moitié des pays en Afrique au Sud du Sahara (46). Seulement six pays ont une population de plus de 20 millions.

Ces petits pays plient littéralement sous le poids de la dette et ne génèrent, par leurs propres efforts, aucune ressource à investir; les programmes d'ajustement structurel, conçus pour diminuer les dépenses dites improductives afin de dégager des ressources à investir dans les secteurs générateurs de flux financiers immédiats n'arrivent pas à véritablement inverser la tendance au désinvestissement interne.

La croissance démographique, dépasse les 3% et absorbe donc tous les gains de la croissance économique et surtout de la production alimentaire qui généralement stagne.

Faute d'investissements et d'injection de technologie moderne, la production agricole s'effectue au détriment de la destruction accélérée des ressources, particulièrement en sols et en forêts.

Cette toile de fond a quelque chose de très spécial comparé aux autres régions du monde. Toute action de développement et donc de recherche, doit tenir compte de cette spécificité du cas africain.

Il ne sera donc pas question, dans cette note de dresser un programme exhaustif de recherches forestières, mais plutôt d'exquisser certes les grandes lignes d'un programme, mais surtout de tracer les grandes lignes des voies et moyens de la réaliser dans un cadre d'effort soutenu et de coopération régionale étroite.

Ce document comprendra donc quatre parties principales:

1. les priorités de recherche pour le développement de la foresterie en Afrique Sub-saharienne
2. les politiques et stratégies de recherche et de financement
3. l'organisation institutionnelle et la coopération régionale
4. les problèmes de financement

LES PRIORITES

Les priorités de recherches doivent être bien entendu liées aux problèmes de développement. En Afrique au Sud du Sahara, les problèmes de développement sont à leur tour très étroitement liés aux conditions écologiques par ailleurs très diverses. Cependant, on peut ramener le découpage écologique à 3 zones principales.

- Une zone, communément appelée Soudano-sahélienne. Elle comprend une majorité de pays distribués autour de la ceinture désertique du Sahara et sont donc tous directement touchés par le phénomène de la désertification et comprennent comme associations végétales des steppes désertiques et savanes arborées à boisées. Même en limitant cette zone aux pays membres du Comité Inter-Etats de lutte contre la sécheresse au Sahel (CILSS): Burkina Faso, Gambie, Guinée-Bissau, Mali, Mauritanie, Niger, Sénégal et Tchad, et du Inter-Governmental Agency for Drought and Desertification (IGADD): Djibouti, Ethiopia, Kenya, Somalia, Sudan et Uganda, cette zone représente 13 millions et demi de km², soit plus de 50% de l'Afrique au Sud du Sahara. Il faudrait certes enlever de la zone certaines parties des hauts plateaux de l'Ethiopie, du Kenya et de l'Ouganda, mais y ajouter le Botswana et la Namibie pour se rendre compte que de fait la sécheresse est le problème écologique le plus important pour plus de 50% des terres au Sud du Sahara.

Ce sont plus de 157 millions d'habitants qui sont concernés soit 36% de la population au Sud du Sahara, toujours en limitant la zone aux pays membres du CILSS et de l'IGADD.

- Une zone humide, géographiquement désignée sous l'appellation de zone de forêt dense humide de l'Ouest et du Centre. Cette zone comprend un territoire continu allant de la Guinée au Zaïre et couvre une superficie de 6 millions et demi de km², soit 28% de la superficie de l'Afrique au Sud du Sahara. Environ 187 millions d'habitants (soit environ 42% de la population de l'Afrique au Sud du Sahara) y vivent.

- Enfin une zone de hauts plateaux frais à l'Est et au Sud du continent, couvrant un peu moins de 4 millions de km² (soit plus de 15% de l'Afrique au Sud du Sahara. Elle renferme un peu moins de 100 millions d'habitants (22% pour l'Afrique au Sud du Sahara).

Bien que très sommaire, ce découpage est acceptable, car il permet de

dégager rapidement les trois facteurs essentiels à prendre en compte dans la promotion du développement durable sur le continent: la lutte contre la sécheresse, la protection des sols contre l'érosion par un aménagement intégré des bassins versants et l'aménagement rationnel des ressources forestières pour le mieux-être des populations. Et les sciences forestières doivent intervenir efficacement dans la solution de tous ces problèmes.

Le Plan d'Action Forestier Tropical, élaboré et lancé en 1985, avait préconisé des actions prioritaires dans cinq domaines (voir tableau ci-dessous)-

Priorités de développement forestier par zone

	Afrique sèche	Afrique humide	Afrique des Hauts Plateaux
Utilisation des terres	X X X		X X X
Aménagement des forêts		X X X	
Bois de chauffe	X X X		X X X
Conservation écosystèmes forestiers		X X X	
Renforcement des institutions	X X X	X X X	X X X

En confrontant ces domaines d'actions prioritaires avec les trois zones écologiques mentionnées, il est facile d'identifier les programmes prioritaires de développement comme suit:

- développement des systèmes agroforestiers pour stabiliser le domaine agricole et sécuriser la production en particulier dans les zones arides et semi-arides du continent
- développement des systèmes d'aménagement intégré des bassins versants pour protéger et conserver les sols dans les zones de hauts plateaux généralement frais mais surpeuplés
- aménagement de la forêt tropicale dense humide pour les besoins

- de l'industrie dans la ceinture humide
- (d) développement du bois de chauffe dans les zones arides et sur les hauts plateaux surpeuplés
- (e) développement des systèmes de conservation des écosystèmes de la forêt dense humide

Vu la situation économique et sociale, on peut dire que tous ces programmes sont prioritaires, cependant, il ne fait aucun doute que du point de vue des forestiers eux-mêmes le problème du bois de feu est de loin leur problème le plus important dans la Région.

D'après l'Annuaire FAO 1989 des Produits forestiers, 423 millions de m³ sur les 478 millions de m³ de bois rond produit sont utilisés comme bois de chauffe.

Le problème du bois de chauffe est en rapport étroit avec le problème de la désertification et sa solution doit faire appel, dans une large mesure, au développement des systèmes agroforestiers. Economies de combustibles et énergies de substitution doivent aussi être recherchées.

La production du bois de feu repose sur deux activités: l'aménagement des forêts naturelles et les plantations. Il faut sans aucun doute entreprendre des recherches sur l'efficacité des prescriptions d'aménagement des forêts naturelles en particulier dans les zones de savanes arborées pour le moyen terme. Mais il faut se rendre à l'évidence qu'en fonction de l'augmentation rapide des hommes et de leurs animaux, l'aménagement des forêts naturelles dans les zones déjà touchées par la pénurie des combustibles ligneux ou qui le seront à court terme, s'avèrera insuffisant. Il faut donc augmenter la production par des plantations et en conséquence, améliorer les performances des espèces ligneuses à usage multiple à utiliser dans ces plantations.

L'amélioration génétique des espèces à usage multiple se présente donc comme la première priorité de la recherche forestière en Afrique au Sud du Sahara. La première phase de la mise en oeuvre d'un programme de recherche sur l'amélioration génétique est l'établissement d'un Centre de Semences Forestières. Ce centre sera géré, dans toute la mesure du possible, par l'institution de recherches forestières, mais devra travailler aussi et peut-être surtout pour les organismes qui effectuent les plantations. Un Centre de Semences doit être doté de personnel et de matériel pour récolter des graines sur des sujets choisis, dans les périodes favorables, conserver ces semences dans de bonnes conditions et entreprendre des tests même sommaires de germination.

Ces centres de semence doivent participer à un réseau d'échange de

graines afin que la recherche puisse élargir la base génétique des espèces à sélectionner.

Il est recommandé que chaque pays puisse être doté d'un centre de semences forestières, même les pays qui ne pourront pas effectuer de travaux d'amélioration génétique au delà de ce stade.

La mise en oeuvre d'autres stades de la recherche sur l'amélioration génétique doit s'effectuer suivant des critères que nous essayerons de définir plus loin. On peut cependant d'ores et déjà dire que du point de vue écologique, la relative homogénéité de la zone sèche autorise à ne pas faire le même travail d'amélioration génétique par un trop grand nombre de pays. Il serait certainement plus fructueux que certains pays entreprennent des recherches sur les espèces améliorées à utiliser dans différentes conditions de sols en particulier micro-conditions édaphiques, les recherches sur les plantations irriguées, etc...

Il faut signaler que la FAO a déjà entrepris un important travail sur l'amélioration génétique en zone sèche par la mise en oeuvre du programme sous-régional de "mise en valeur des ressources génétiques de ligneux à usages multiples" (projet GCP/RAF/234/FRA financé par le gouvernement français). Ce projet a démarré en janvier 1988, suite aux deux ateliers régionaux de Nairobi (janvier 1986, février 1987), organisés par IUFRO en collaboration avec la FAO, et réunissant 14 pays de la zone soudano-sahélienne. Ce programme vient en appui à 17 pays soudano-sahéliens de l'Afrique de l'Ouest et de l'Est dans le domaine de l'approvisionnement en semences forestières et de l'amélioration génétique du matériel végétal. Le projet a préparé ou contribué à formuler des documents de projets nationaux et a assisté le pays dans la soumission des dossiers aux bailleurs de fonds.

En Afrique de l'Ouest, ce travail a été complété par la formulation d'un document de volet régional d'appui et de coordination pour les 9 pays du CILSS (CILSS/FAO/IUFRO 1989). En outre le projet a contribué à préparer un certain nombre de manuels et guides techniques tenant compte des données du contexte soudano-sahélien et destinés à appuyer les équipes nationales en place ou à venir en proposant un certain nombre de normes et des méthodologies de référence.

La recherche sur l'amélioration génétique est aussi d'une grande priorité en ce qui concerne la zone humide mais vient en seconde position, après les recherches sur les systèmes d'aménagement et de conservation de la forêt naturelle; cependant, les pays de la zone humide doivent aussi participer au réseau d'amélioration génétique, la production de bois d'oeuvre, doit provenir, à long terme et pour une grande part des

plantations.

Une initiative de la Commission des Communautés Européennes (1985) ayant pour but d'organiser la recherche sur l'amélioration génétique des feuillus tropicaux, n'a pas pu malheureusement se matérialiser jusqu'à présent.

La recherche sur l'amélioration génétique doit figurer en bonne place dans les recherches forestières dans la zone des hauts plateaux frais de l'Est et du Sud. Dans cette zone, on a effectué un grand travail de reboisement avec des espèces exotiques. Après les récentes attaques d'insectes dans ces plantations, il est devenu nécessaire d'élargir la base génétique des espèces introduites et produire des souches résistantes aux attaques des insectes et autres maladies.

Le développement des systèmes agroforestiers en vue de stabiliser le domaine agricole et sécuriser la production agricole, est la deuxième priorité du développement de la foresterie en Afrique. Tout comme pour le programme bois de chauffe-énergie, la foresterie n'est pas seule concernée, elle a une grande responsabilité dans le choix des espèces ligneuses et de leurs performances à fournir du bois, du fourrage, des fertilisants au sol... etc. Evidemment, ce qui est important, c'est le résultat de l'interaction sur le plan de la production agricole entre ces ligneux et les plantes agricoles et fourragères dans les systèmes de production agricole.

L'aménagement des forêts de la zone humide constitue la troisième priorité de la foresterie dans la Région. Il est vraiment regrettable que depuis bientôt un siècle que les forêts tropicales sont soumises à une exploitation commerciale du bois d'oeuvre, peu d'expériences d'aménagement ont été suivies pour définir des systèmes d'aménagement efficaces et propres à ces écosystèmes. Pour une grande part, les inquiétudes actuelles concernant la disparition de la forêt tropicale et de sa diversité biologique viennent en fait de la quasi-inexistence, dans la majorité des pays, de systèmes d'aménagement aux prescriptions respectées et exécutées.

Le programme de recherches concernant l'aménagement de la forêt tropicale humide doit concerner l'augmentation de la production de bois d'oeuvre par des systèmes appropriés d'aménagement, ainsi que la conservation et l'entretien de la diversité biologique. Il doit également concerner l'amélioration de la productivité des plantations forestières.

On peut résumer de la façon suivante l'essentiel des projets de recherches prioritaires et pour lesquels, la Région peut solliciter un appui extérieur dans le cadre d'un système de travail coopératif.

Projet en Amélioration Génétique

L'objectif du projet est de fournir à l'aménagement forestier du matériel végétal plus productif et mieux adapté, résistants aux maladies et surtout d'améliorer les performances des ligneux à usage multiple utilisés dans les systèmes agroforestiers et les aménagements intégrés des bassins versants.

Le projet consisterait en:

- établissement d'un Centre de semences si possible par pays
- identification des écotypes et provenances des différentes espèces
- essais d'introduction et de provenances
- travail de sélection proprement dit

Projet aménagement de la forêt tropicale humide

L'objectif du projet est de mieux comprendre la structure et le fonctionnement des écosystèmes forestiers tropicaux afin de mieux exploiter, sur une base soutenue, tout leur potentiel de production de bois et autres produits non-ligneux.

Le projet consistera en:

- étude des systèmes d'aménagement et d'exploitation mis en oeuvre et les conséquences sur la production des écosystèmes
- mise en place de systèmes d'aménagement expérimentaux
- étude des quantités, valeurs économiques, sociales et culturelles des productions ligneuses et non ligneuses autres que le bois d'oeuvre

Projet recherche sur les systèmes agroforestiers

Les recherches sur les systèmes agroforestiers comportent deux volets: un volet technique et un volet social. L'objectif du volet technique est la détermination des combinaisons optimales ligneux-plantes agricoles ou fourragères pour produire de manière durable, une gamme donnée de produits. L'objectif des recherches sur le volet économique et social est de déterminer les impédiments de nature politique, économique et sociale, à l'adhésion des paysans et des communautés aux pratiques jugées techniquement les meilleures.

Le projet de recherche doit consister en:

- détermination des diverses combinaisons optimales des composantes des systèmes
- évaluation économique et sociale de ces combinaisons

Projet de recherches sur la participation des populations dans le développement forestier

Les objectifs sont:

- a) identifier et lever tous les obstacles qui empêchent les populations et les communautés de participer activement dans les activités d'aménagement et de conservation des forêts
- b) établir de meilleures mesures institutionnelles et des organisations professionnelles en vue de promouvoir une meilleure efficacité de la participation des populations

Le projet examinera:

- les mesures administratives et politiques
- les systèmes d'acquisition et de gestion des forêts
- les problèmes d'incitation
- les structures organisationnelles (coopératives, rôle des entreprises industrielles et commerciales, etc...)

Projet de recherches sur les plantations forestières irriguées

L'objectif est:

- de déterminer les espèces les plus appropriées ainsi que les dispositifs les plus efficaces de brise-vents et rideaux-abris dans les périmètres irrigués
- de reboiser les terres irrigables par les eaux de drainage des irrigations et récupérer les sols marginaux à l'intérieur des périmètres irrigués pour la production de bois de feu et de service en zones aride et semi-aride
- le projet entreprendra des essais de plantation d'espèces et de combinaisons avec les cultures agricoles
- évaluera les résultats sur les plans de la production alimentaire et l'efficacité économique et sociale
- entreprendra des essais sur les espèces les plus appropriées à tirer avantage de l'utilisation des eaux de drainage pour produire du bois et autres productions alimentaires (fruits, fourrages... etc)

LES POLITIQUES ET STRATEGIES DE RECHERCHES ET DE FINANCEMENT

On constate, à travers les nouvelles déclarations de politique forestière que sans doute les objectifs changent d'un pays à l'autre, cependant les stratégies se rejoignent pour favoriser l'intégration, la participation et la durabilité. Ces trois mots clefs traduisent les préoccupations essentielles des forestiers aujourd'hui en Afrique. Cela donne, sans aucun doute une place prépondérante aux recherches sociales dans le système de recherche

à mettre en place.

Chaque pays aussi petit et aussi démuné soit-il devrait avoir une Unité de recherche chargée d'étudier les impacts sociaux et l'acceptabilité des techniques et technologies proposées. Cette Unité devrait bien sûr, et cela dans toute la mesure du possible, participer à l'élaboration des paquets technologiques ou en tout cas procéder à leur adaptation.

La durabilité des actions de développement commande une durabilité de l'effort de recherche aussi. C'est pourquoi, la stratégie à favoriser sera de ne pas faire entreprendre par un pays même avec une aide massive des actions qui ne peuvent, de toute évidence bénéficier, même à terme, d'un effort soutenu de la part du pays concerné.

Les possibilités de financement interne doivent donc être utilisées pour déterminer, pour chaque pays, quelles activités de recherches doivent être entreprises sur le plan national et pour quelles activités, le pays devrait plutôt s'en remettre à un système régional de recherche, ou plus exactement aux résultats des recherches entreprises dans d'autres pays.

Une bonne indication des capacités de financement de la recherche forestière dans chaque pays serait de partir de la valeur de la production forestière et projeter que 0,26% sera consacré à la recherche forestière dans un terme déterminé. Ce pourcentage de 0,26% représente actuellement ce que les pays développés consacrent à la recherche forestière. Il ne serait pas réaliste de proposer de dépasser cela, à moyen terme. L'assistance à chaque pays, dans le cadre de la recherche forestière doit avoir pour premier objectif de mettre en place, dans un terme à définir, un programme de recherche que le pays en question pourra prendre en charge.

Les activités régionales ne doivent pas consister à mettre en oeuvre des programmes communs, financés en communs ou mettre en place des institutions et centres régionaux communs. L'échec des expériences récentes d'entreprises régionales de ce genre où une contribution financière est demandée aux pays membres ne fait plus aucun doute. Les activités régionales doivent se limiter au départ aux échanges d'information, pour évoluer petit à petit vers la coopération et la coordination.

L'objectif est de permettre à chaque pays, de pouvoir disposer des résultats de toutes les recherches entreprises dans la région, et plus particulièrement dans la zone écologique qui l'intéresse.

L'ORGANISATION INSTITUTIONNELLE ET LA COOPERATION REGIONALE

Le programme de recherches forestières comporte deux volets institutionnels:

- le volet au niveau national
- le volet régional

Niveau national

Le premier objectif du programme est de renforcer les institutions nationales de recherche suivant les principes stratégiques déjà énoncés. Avant toute assistance à une institution nationale, il est important de l'évaluer et concevoir un programme en liaison avec le programme de développement forestier et les capacités de financement du pays. Cet exercice a pour but essentiel de promouvoir des institutions de recherches efficaces et taillées à des dimensions raisonnables.

Il est indispensable cependant, que toutes les institutions de recherches soient dotées d'unités en recherches économiques et sociales, chargées d'étudier les impacts socio-économiques du développement forestier. Bien entendu, ces unités peuvent avoir des dimensions variées suivant les pays; mais ces unités sont essentielles pour une meilleure compréhension de problèmes sociaux et économiques des populations dont on cherche la coopération.

Il est également nécessaire de mettre en place, au niveau de chaque pays, un Centre de semences forestières. Ce centre sera le point de départ pour toutes les recherches forestières en amélioration génétique et aussi pour la conservation de la bio-diversité. Ces centres de semences devraient faire partie dans toute la mesure du possible, des institutions de recherche.

Tout comme les Unités de recherche en sciences sociales, ces centres de semences auront des dimensions variées selon les pays et auront des programmes de travail plus ou moins élargis. Les objectifs principaux sont d'abord de fournir de bonnes semences aux projets de reboisement, ensuite de faire participer le pays aux échanges de matériel génétique, et enfin de servir de point de départ aux programmes d'inventaire et de conservation de la bio-diversité.

La troisième unité de base dans les institutions de recherche au niveau national, doit être l'unité de liaison entre les pays et le reste de la communauté des chercheurs dans la région et aussi entre l'institution de recherche elle-même et les institutions de développement forestier. L'objectif de cette unité est de permettre à chaque pays de pouvoir

connaître et profiter des résultats des recherches entreprises dans d'autres pays.

Dans les cas extrêmes où les pays ne peuvent vraiment pas faire d'efforts significatifs en matière financière pour la recherche forestière, le système de recherche peut se réduire à ces trois unités de base qui pourraient être d'ailleurs de dimension très modestes, tout en restant efficaces.

Au delà de cette base institutionnelle minimale, les programmes de recherches au niveau de chaque pays, doivent faire l'objet d'une étude particulière: inventaire des programmes existants, leur adéquation avec les programmes de développement forestier projetés, le degré d'engagement du pays et ses possibilités actuelles et futures de financement, etc...

Les programmes formulés sur cette base seront aussi confrontés avec les programmes déjà existants dans la région et réajustés en conséquence.

Au niveau régional

Il s'agira de créer un système de liaison efficace entre les chercheurs et institutions nationales qui puissent évoluer en un organe de coopération et de coordination.

Les trois objectifs essentiels d'un tel réseau seront au départ:

- faire un inventaire des recherches en cours dans la région
- aider les pays dans l'élaboration de leurs programmes de recherche en particulier les programmes qui doivent entrer dans le cadre de la recherche coopérative
- établir un réseau d'information et d'échange

La structure institutionnelle peut être conçue à l'image de celle de FORSPA (Forestry Research Support Programme for Asia and the Pacific). Elle comprendrait donc une unité de coordination et de conseil et un programme coopératif de recherche.

Cependant les institutions africaines de recherches forestières ne sont pas aussi solidement structurées, équipées et dotées de personnel adéquat comme leurs homologues en Asie. Très peu d'entre elles peuvent présentement participer efficacement à un programme coopératif de recherches avant d'avoir subi une sérieuse réhabilitation.

On peut toutefois gagner du temps en diagnostiquant en premier lieu les capacités réelles de certaines institutions nationales, apparemment en mesure d'entreprendre des recherches dans le cadre d'un programme coopératif sur les projets identifiés au paragraphe 3. Ainsi par exemple en matière d'amélioration génétique, un certain nombre d'institutions

nationales semblent pourvues en personnel qualifié et pourraient constituer le noyau de départ d'un programme coopératif, organisé et géré sur le modèle de FORSPA.

La structure régionale doit aider les gouvernements et les Donateurs, à faire un diagnostic plus détaillé de chaque institution nationale et proposer un programme de recherches suivant les critères déjà définis. Très peu d'institutions seront en mesure d'embrasser une gamme étendue de thèmes de recherches, mais pourront concentrer leurs efforts et moyens limités sur quelques thèmes. Le résultat sera de créer un nombre plus élevé d'espèces de centres d'excellence sur presque tous les thèmes et rendre donc la coopération voire la coordination absolument nécessaire.

FINANCEMENT

En toute première chose, le financement des institutions de recherche en Afrique doit être conçu dans le cadre d'engagement à long terme. Il ne faut pas lancer de grands programmes de 5 ans, qui pourraient être abandonnés après, mais au contraire des programmes modestes pour chaque centre pris individuellement, mais soutenus par l'assistance extérieure sur une plus longue période.

Au niveau national

Comme déjà signalé, il y a vraiment peu d'institutions de recherches capables d'entreprendre des projets de recherches dans un cadre coopératif, sans avoir été au préalable réhabilitées.

Ce renforcement des institutions nationales doit se faire suivant un processus semblable à celui mis en place pour l'exercice du PAFT, mais suivant les critères déjà définis. Chaque institution sera réhabilitée en fonction du programme qui sera retenu pour être appliqué par elle. Le choix du programme possible sera laissé à l'initiative des pays.

Au niveau régional

La structure de financement de FORSPA peut servir de modèle, au programme régional, mais il faudra renforcer la dotation en consultants spécialisés pour les revues de réhabilitation des institutions.

Le financement du programme régional doit se faire par étape, suivant l'ordre chronologique d'exécution de ses tâches:

- Etape 1: Mettre en place la cellule de coordination qui aura pour tâches immédiates:
 - organiser le réseau d'information
 - identifier et formuler un premier programme coopératif entre les institutions apparemment en mesure d'entreprendre des travaux de recherches sur certains thèmes (avec bien sûr un peu d'assistance)
- Etape 2
 - gérer le premier programme coopératif
 - identifier les besoins de réhabilitation et de renforcement des institutions nationales
 - élargir en conséquence le programme coopératif
- Etape 3
Gestion du programme coopératif qui doit évoluer vers un véritable système de coordination de la recherche dans la région

Les étapes 1 et 2 ne doivent pas dépasser 3 ans chacune.

CONCLUSIONS

- L'amélioration génétique des ligneux à usage multiple, en particulier en zone soudano-sahélienne; les recherches sur les systèmes d'aménagement de la forêt dense humide, les recherches sur les systèmes agroforestiers, les recherches sur les problèmes relatifs à la participation des populations au développement forestier et les recherches sur les plantations forestières irriguées, constituent les domaines de recherche prioritaires en Afrique.
- Il est essentiel, pour obtenir des résultats substantiels rapidement et consolider les progrès, de pouvoir distribuer les besoins de recherches entre les différentes institutions nationales et mettre en place un réseau d'abord d'information et d'échange qui doit cependant évoluer vers la coopération et la coordination.
- Il est essentiel d'obtenir des engagements financiers à long terme, en relation avec les capacités réelles des pays à faire un effort financier adéquat et soutenu.

FORESTRY RESEARCH IN THE AMERICAN TROPICS

by

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Abstract

The extraordinarily diverse tropical forests of South and Central America are concentrated in the Amazonian and Caribbean Basins. Saving and managing these ecosystems requires an unprecedented multidisciplinary research effort, which should be centred on key scientific institutions operating in the Latin America and the Caribbean (LAC) region. A research network is proposed to meet those research needs.

CATIE is the region's leading forestry and agroforestry research organization; a primacy gained in 50 years of sustained efforts aimed at integrating agriculture and natural resources. CATIE interacts successfully with national and international research organizations; it has a vigorous continent-wide educational mandate and it is a leader in the conservation of woody plant germplasm.

INTRODUCTION

The Center for Tropical Agricultural Research and Education (CATIE), in collaboration with other regional research institutions and concerned governments, proposes to lead the development and implementation of a tropical forestry research network that will contribute to a reduction in the rate of deforestation and to an increase in sustainable land use practices in the humid tropics of Latin America and the Caribbean. This proposal attempts to respond to critical forestry and agroforestry problems identified by the region. An ecoregional approach is taken to identify critical areas for research.

In the twentieth century Latin America has undergone a demographic revolution, its population doubling every 37 years. At the turn of the century its population was 50 million, while at present it stands at 450

** Presented by R. Guevara Moncada, Director General.

million and will probably reach 716 million by the year 2020. Such growth places enormous pressure on social structures and natural resources. Population growth drives a two-fold process, urbanization and migration to the forest. Forest colonization has acquired extraordinary impetus, particularly after the Second World War. Thousands of migrant families, from more densely inhabited and ecologically degraded areas, have transplanted their extensive production systems, threatening the survival of indigenous peoples and intensifying degradation of very fragile ecosystems. Forest colonization has been greatly favoured by governmental policies and investments such as tax incentives and ill-planned road construction.

Perhaps the most directly affected by the influx of colonists into the forests are the estimated 10 million indigenous forest-dwelling people in Latin America and the Caribbean (LAC). Traditionally disadvantaged, these people find that as a rule, governments side with the settlers.

The economic systems of LAC countries are undergoing an unprecedented process of structural adjustment. The role of the state is changing, from a producer to a promoter of the private sector. Some countries are taking the first painful steps to stabilize their economies and embark on a growth path based on an open, outward-looking development policy, and promotion of higher value products to compete on the international market. Investment funds are severely constrained by massive foreign debt. There is also a widening import-export imbalance and great pressure to produce for export, which has led to exploitation and degradation of fragile ecosystems. In rural areas underemployment rates approach 40 percent, particularly affecting the small landholder sector.

In many respects Latin America and the Caribbean is worse off than Asia or Africa and the need for immediate international support, at unprecedented levels, is clear. The fact that the region has the largest forestry reserves in the world with the greatest diversity of forest species, mostly little known, argues strongly in favour of such immediate assistance.

The amount of forest land on either a per capita or a surface area basis puts LAC in the forefront of both the problem and potential solution. Latin America lags behind other regions in terms of total forestry projects, number of training institutions, and research expenditures in forestry. This fact becomes more alarming when the total resource endowment is taken into account, and the ratios of research, training and project support on a forest unit area basis are considered. Thus in 1980 forestry research expenditures in Asia were \$102 million versus \$27 million for LAC. According to Gregersen (1991), in 1988 Asia had almost 6,000 forestry researchers, compared to the 3,800 in LAC.

Latin America and the Caribbean has some 678 million hectares of wet tropical forest, more than half located in the Amazon basin. There are also 108 million hectares of secondary forest. Deforestation figures for the LAC region vary between 12 and 4 million hectares yearly. But even if the lowest figure is accepted it is twice the amount lost in Asia and four times that in Africa. Deforestation rates have been increasing in all countries. The annual forest conversion rates for individual countries are catastrophic: 600,000 hectares in Colombia and 250,000 hectares in Peru. The Central American region loses almost 370,000 hectares per year. Shifting cultivation and extensive cattle ranching account for 75 percent of deforestation in LAC; 13 percent is for firewood collection, and 12 percent is extracted as lumber for industry and other purposes. The World Resources Institute (WRI) has estimated that between 1950 and 1980 some 160 million hectares of forest have been converted to pastures.

FOREST INDICATORS FOR LAC, AFRICA AND ASIA

CHARACTERISTIC	LAC	AFRICA	ASIA
Closed Forests (mil ha)	722	220	409
Open Forests (mil ha)	207	465	87
Total Forest (mil ha)	929	685	496
Plantations	4.6	1.8	5.2
Forest Land per capita	1.8	0.7	0.1
Forest as % of Total Land Area	47	27	25
Forest Research Exp. (mil \$/y)	27	26	103

Herd Commission Report to CGIAR, March 1991.

One of the worst features of deforestation and the utilization of unsustainable production technologies is the increase in soil degradation, particularly erosion. The most degraded areas are the densely populated foothills and highlands of Central America and the eastern slopes of the Andean Cordillera. The loss of biological diversity, especially in the Amazonian Basin, represents another level of incalculable waste.

Unlike Africa and Asia, an estimated 85 to 90 percent of Latin America's forest products are consumed within the region. Economically, the trends in production and forest product trade are difficult to deduce from available statistics. Some countries, notably Chile, Argentina and Brazil are net exporters of forest products. Most are increasingly net

importers.

FOREST PRODUCTS TRADE IN LAC (1983-1989)

TRADE (\$000s)	1983	1985	1987	1989
Exports from LAC	385,731	372,486	432,599	410,848
Imports to LAC	989,269	1,228,660	956,260	693,485
(Trade Imbalance)	603,538	856,174	523,661	282,637

Forest conversion to unsustainable agriculture is a primary manifestation of inappropriate policies, poor land-use planning capability, and a shortage of applied alternatives. Traditional responses to deforestation include park and extractive reserve development, forest plantation establishment, and agroforestry.

In the last two decades Latin Americans have slowly begun to accept the fact that natural resources, particularly tropical forests, are valuable national assets that merit protection. A growing number of pressure groups have firmly established conservation in the national and international agenda. In the years to come the call for enlarging the areas under protection will grow stronger. These areas include national parks, natural monuments, wildlife sanctuaries and protective forests for critical watersheds.

Protected natural areas of the American tropics have expanded considerably. A recent International Union for the Conservation of Nature and Natural Resources (IUCN) document indicates that at present they cover some 103 million hectares, still a fraction of the existing forests. However, given the growing public awareness and desire for action, it is feasible that by the year 2000 an additional 5 million hectares will be added.

Central American countries have over 3 million hectares in national parks, mostly in the wet forest of the Caribbean. Brazil has made substantial progress, and now has 20 million hectares under protection. Peru has over 4 million hectares and Bolivia 6 million. Brazil and Peru have their largest units in the Amazon basin.

There are also several million hectares of protection forests in critical watersheds where hydroelectrical projects have been constructed.

All of these protected areas are under severe pressure from a rising population.

TROPICAL FORESTRY RESEARCH IN LATIN AMERICA AND THE CARIBBEAN

The Existing System

Forestry research in Latin America is conducted by a plethora (205) of institutions of varying capabilities, competing for limited resources, and undertaking an extraordinary diversity of research. According to de Camino (1988), 75 percent of all research institutions are concentrated in five countries: Argentina, Brazil, Chile, Colombia and Mexico. Of all institutions carrying out forestry research, universities represent 41%; another 24% are public research centres; 23% are forest services; and 12% are private. There is a wide variation in quality, size and capacity. Some only have a single researcher, and others up to 200, the average number of technical personnel being 16.

With respect to the academic training of forestry researchers in LAC, about 6 percent hold PhD's, a surprisingly high 46 percent hold Masters' degrees and 27 percent hold Bachelor degrees. There is a paucity of technical personnel: 21 percent.

Forest services in most countries do very little research, spending most of their resources in fiscal control and police actions. Most countries do not have forestry extension services. Generally there is a critical lack of even the most basic extension materials such as flipcharts, films or user's manuals. Most of the existing teaching material is not adapted to the socio-economic and cultural conditions of peasant farmers.

Few centres have a critical mass of researchers. They tend to have too many principal staff relative to assistants and support staff. In most institutions, the best scientists lack assistants, who could multiply their capacity. Generally there is poor motivation due to low salaries, weak incentives, low productivity and inadequate support. There is very little interdisciplinary teamwork. A few national and regional institutions are staffed by outstanding professionals capable of producing good research, but are stultified by the lack of operating funds. All centres have libraries but most libraries are poorly stocked. Lack of funding prevents them from subscribing to scientific journals or from publishing and distributing results. Even the good organizations suffer from instability and excessive diversity in research topics. Personnel turnover is high, thus much research is abandoned half way.

A large number of programmes concentrate on plantations and silvicultural practices, including nurseries, reforestation and plantation management. There has been neglect of fields such as policy and human

settlements. At the same time there are fields such as silviculture of native forests, in which much work has been done but with very little transfer of knowledge gained.

At the regional and country level there are many institutions performing uncoordinated research. Only a fraction of the research is passed on. Much of the research carried out has a limited application in the real world of problems. An inordinate proportion of resources has been invested in buildings and laboratories, while there is low availability of operating equipment, and minuscule operating and maintenance budgets.

In a recent paper (1989), Gregersen shows that forestry researchers in Latin America and the Caribbean feel that increased investment in forestry research should be distributed, first, to incorporating and training more scientific and technical personnel; second, to improving equipment; and third, on more experimental stations, installations and support for libraries. A forestry research programme to improve Latin America's natural resource management and sustainability must address both research agenda and institutional constraints which limit its implementation.

Research Needs

Based on the developmental, environmental and institutional profiles sketched above, several attempts have been made in recent years to identify the priority areas in which research should be concentrated (CGIAR 1990, IUFRO 1987, Bellagio II 1988, Gregersen *et al.* 1989, INFORANDES 1990). The following list of priority research areas specific to the American tropics builds on those efforts.

1. Agroforestry
2. Natural forest management and conservation
3. Tree breeding and improvement
4. Utilization and market development
5. Policy and socio-economic issues.

Who can take the lead in each research area?

There are outstanding national, regional and international institutions with strong programmes in particular areas, e.g. CATIE in integrated applied research, CIAT in land use hillside farming, the Smithsonian Tropical Research Institute and the Organization of Tropical Studies in tropical forest ecology. Among the national agricultural research institutions (NARs) in tropical Latin America, Brazil's EMBRAPA clearly stands out as one of the best.

At international fora it has been stressed that the key to successful research is strengthening the national institutions. The biological, cultural and institutional diversity of Latin America and the Caribbean requires that field research be dispersed among different locations and organizations, which, in turn, requires an efficient conduit for external assistance. The regional institutions mentioned above have long fulfilled this role. They have proven to be the fastest, most cost-effective mechanism, and the one with greatest continuity.

CATIE'S UNIQUE FORESTRY CAPABILITIES

CATIE is the only regional forestry and agroforestry research centre in Latin America. It has developed extensive experience and qualifications in integrating research in agriculture and livestock production with forestry. This experience is available to help meet Latin America's research needs, potential and interest in participating in an expanded forestry research effort.

CATIE has been pursuing integrated, multidisciplinary research in tropical America since 1942. It has a strong institutional memory reflected in continuous records of research performed on its own experimental sites and in the scientific and popular publications over the past five decades. This experience has generated exceptional qualifications and capabilities:

- CATIE is located in a humid tropical forest area, on its own 1 100 hectare experiment station. This station includes habitats, ranging from clear cultivation, through pastures, to regenerated and natural forests. Its woody plant collections are the most comprehensive in the hemisphere and are available to investigators in tropical Latin America. CATIE's stability, its record in maintaining and expanding this collection for half a century, and its tissue culture capabilities, makes this an optimal choice as a centre for tropical germplasm research.
- A complete physical complex is in place, including offices, shops, housing, laboratories, classrooms, communication facilities, library and special collections, supporting electronics, and the staff to manage them. CATIE's capability in geographic information system (GIS) is the best in Central America.
- Over the last decade, CATIE, jointly with national institutions has built a unique multiple-use-tree database (MIRA) which has already been

used to develop yield and growth models. Likewise, CATIE's work in primary and secondary forest management and agroforestry systems is pioneering.

- CATIE has a dedicated staff of 800, of whom 200 are professionals. Staff members originate from North and South America, the Middle East, Asia, Europe, Australia and New Zealand. The Center oversees a nine-country network in agriculture and renewable resources (REDCA) that promotes cooperation and complementarity in research and education. Through this network, CATIE maintains close ties with national and international research institutes, universities, ministries, and non-governmental organizations in member countries. The Center has strong links with similar institutes in Europe, the United States, Asia, and Africa.
- CATIE operates one of the world's premier graduate programmes in tropical forestry and agriculture. Graduates represent some 35 nations, and almost all work for national research institutes and universities in their country of origin. Short courses tied to research are attended each year by up to 1,500 people from around the world.

These basic capabilities are being matched by significant improvements in management. CATIE conducted an inventory of all ongoing research in the member countries and reprogrammed its operations in a ten-year strategy. This was supplemented by an independent evaluation which has led to further improvements in management and governance. CATIE recently revised its constitution to create a self-perpetuating board in the International Agriculture Research Centre (IARC) pattern. This revision was sponsored by CATIE's donor support group (the same as CGIAR's) and was approved by the Interamerican Board of Agriculture. Although CATIE suffers from a limited core budget, these improvements have favourably influenced prospects for continued funding from CATIE's traditional donors.

It is worth mentioning that CATIE's capabilities to operate at a continental level have been additionally enhanced by the recent signature of a cooperation agreement with the International Center for Tropical Agriculture (CIAT) and the Interamerican Institute for Cooperation in Agriculture (IICA), whose institutional strengths support each other. Furthermore, the International Council for Research in Agroforestry (ICRAF) will begin a Latin American effort jointly with CATIE. Starting

in 1993, ICRAF will station the first two scientists at CATIE.

A PROPOSED LATIN AMERICAN FORESTRY RESEARCH NETWORK

To address the topic areas identified in previous sections an imaginative institutional set up will be required. The conceptual framework for such an approach is outlined in the next section and the concrete proposal is developed in the last section.

Resolving the Institutional Constraints

Past experience in international research demonstrates that there are eight basic principles for resolving institutional constraints:

(1) Tight network linkages produce a critical mass. Given the ecological, institutional, and cultural diversity of the region, an effective and efficient forestry research programme must be based on a network of superior regional and national institutions, tightly linked by an agreed research agenda. Properly led, such a network provides the critical mass of professionals needed for tangible results. Support to this network should seek to maximize the effectiveness of existing capacity, facilitate intra-network interchange, and encourage expanded support from domestic sources and donors.

(2) Strong central leadership. With limited funds, maintenance of the needed focus on a taut research agenda requires effective central leadership. The lead institution must enforce adherence to the agreed agenda, yet be aggressive in cutting off unproductive lines of work. The leader must be constantly aware of work in progress, and facilitate the interchange of information which can drive progress towards the desired goal.

(3) Stability and continuity. Historically, programme stability and continuity has been a function of donor involvement. CGIAR, operating within an essentially unlimited time frame, should bring to network operations a stability that improves on the typical 5-year span of donor projects.

(4) Commitment. The effectiveness of research performance, like that of institutional performance, requires commitment by investigators and management alike. They must be involved in the agenda formulation process, and must become committed both to the goals which emerge, and the pathways to those goals.

(5) Concentration. The tremendous variety of worthwhile topics to be researched in tropical America is a major factor in the dispersed character

of tropical research. In addition to defining a concentrated network of institutions and investigators, CGIAR will have to assure a comparable disciplining of a highly delimited research agenda.

(6) Synthesis of existing research results. Latin American forestry research has concentrated on silviculture, reforestation, plantation management, and tree characteristics, almost to the exclusion of the management of natural forests. This repetitive research should be discouraged until the acquired knowledge has been synthesized and specific gaps defined. Without it, the wasteful repetition will continue and more productive lines will be neglected.

(7) Integration. Forestry research cannot be conducted in isolation from other natural resource utilization or from the socioeconomic impact of human populations. The disappearance of natural forests is a phenomenon of human wants and needs, in large part to convert the land on which the forest grows to agricultural uses. Protection of the forest requires that ways be found to satisfy these human needs, to mitigate or delay their impact. This will require the integration into forestry research of agriculture, agroforestry, watershed management, land use policy, land use planning and incentives, as well as research into the socioeconomics of human settlements. This integrative approach is of necessity multidisciplinary.

(8) Incorporation of policy research. The studies of natural resource policy, which in essence provides the incentives, disincentives and regulation of human endeavour, including natural resource use, has been neglected. Yet the current crisis in natural resource management is less the result of "natural" phenomena than of misguided and outmoded policies established by governments. The need to clear land in order to claim title, the skewed economic incentives for rearing livestock rather than timber, and the distorted land market and labour policies which stimulate settlement are examples of these policy flaws.

Proposal for a Research Network Led by CATIE

CATIE proposes to address the research issues identified in previous chapters through a networking mechanism which will operate in Latin America and the Caribbean. CATIE would be the leading agency in charge of its implementation. Given that the Mesoamerican tropics (Mexico, Central America and the Caribbean), the Amazon and the Andes, are three distinctive regions and that there, institutional arrangements that facilitate networking activities already exist, CATIE proposes to operate as follows:

(1) In Mesoamerica

In the Mesoamerican tropics the focal mechanism will be the Regional Cooperation Network for Agriculture and Natural Resources (REDCA). This network was founded by CATIE in 1986 and at present has 94 research, education and policy institutions from Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, the Dominican Republic, the United States and Canada. Mexico and Venezuela are at present organizing national committees to join REDCA in the next few months. REDCA also has affiliates that operate at the regional level, such as the Central American Programme of the International Union for the Conservation of Nature and Natural Resources (IUCN) and the Nutritional Institute of Central America and Panama (INCAP). REDCA by-laws allow for the incorporation of institutions from other countries, such as Brazil and the Caribbean Islands, if desired. CATIE and some individual members of the network already have links with other research organizations in the region such as the Smithsonian Tropical Research Institute (STRI) and the Organization for Tropical Studies (OTS).

CATIE's key role in the preparation of the Tropical Forestry Action Plan for Central America has further strengthened its links with national and international research institutions and the donor community. In many of the twenty-five projects submitted for consideration to donors, CATIE is proposed as one of the implementing institutions.

(2) In the Amazon Basin

In the tropical region of South America, CATIE proposes to develop forestry and agroforestry research with PROCITROPICOS as the focal mechanism. This network, sponsored by the Interamerican Institute for Cooperation in Agriculture (IICA), consists of national research institutions from Brazil, Venezuela, Colombia, Ecuador and Peru.

(3) In the Andean Region

In the Andean region (Venezuela, Colombia, Ecuador, Bolivia, Peru, Argentina, Chile) CATIE intends to work through the proposed INFORANDES forestry research network which has been endorsed by the Ministers of Agriculture of the first five of these countries. The intent of INFORANDES is to strengthen the research capability of the national institutions, and to identify and execute national and regional research

projects. It will operate with the help of a regional coordinator, who has already been appointed, as well as with coordinators in each country. This network has identified research priorities which have been included in this CATIE proposal. Contacts with the Amazonian Cooperation Treaty, a pro tempore entity, will also be established in the near future.

CATIE and CIFOR

It is also proposed that CATIE should be the node of CIFOR (Center for International Forestry Research) for LAC. The new government structured at CATIE, which is impervious to political meddling, and its indisputable advantages as a regional centre, make it an ideal partner for CIFOR.

This arrangement would: a) allow CIFOR to start on firm ground in LAC; b) permit the research effort in LAC to be part of a bigger network made up of other modes chosen by CIFOR in other continents; c) start with a strategic plan and committed funds to begin activities in a short period of time; d) strengthen existing subregional networks such as REDCA and PROCITROPICOS.

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SUPPORT FOR FORESTRY RESEARCH IN THE NEAR EAST: NEEDS AND PROSPECTS

by

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Abstract

Near East countries are suffering from forest degradation due to human and animal pressures exacerbated by the harsh environment and by mismanagement. Research is fragmented and mostly un-coordinated both within and between the countries of the region. It is suggested to organize multi-disciplinary research networks on a sub-regional basis. Two priority research areas are suggested, namely forest restoration and sustainable multi-use forestry.

INTRODUCTION

In FAO's classification, the Near East (N.E.) Region comprises 26 countries, out of which 20 are Arab countries. The Region spreads over 17.5 million km² in North Africa and West Asia. The total population of the region is about 465 million (1990/1991), growing at 3.1% on the average; one of the highest rates in the world. The main feature of the N.E. region is the vast deserts in each country (75% of the total N.E. area), which seriously limit food, fodder and timber production. Water for irrigation has become as scarce as good arable land itself. The forest resources of the region are quite diverse and vary from one country to

another. They are being assessed by FAO (FAO, 1988).

The countries differ substantially in their ecological, social, economic, and political characteristics, but they all suffer from serious land degradation in general and forest depletion in particular. Although the type, extent and consequences of degradation may vary from one country to another, the common cause is the high pressure of human and animal populations exacerbated by harsh environmental conditions. National rehabilitation measures vary greatly in terms of political commitments, expenditures, social participation and effectiveness.

There are long traditions in forestry in many countries of the region covering mainly the harvesting of timber, fuelwood and other forest products; animal grazing, watershed management, fire control, silviculture, reforestation, afforestation and sand dune stabilization. Forestry research has been carried out in several countries for a good number of years. There are well established forestry research institutes with highly qualified staff and adequate financial resources (FAO, 1986). Nevertheless, the impact of forestry research on the development of the forestry sector and mitigation of forest degradation has been modest so far.

Forestry research in the N.E. countries has so far addressed itself primarily to forest botany (taxonomy, dendrology, etc.), forest ecology, tree physiology, wood properties and more recently, short and medium-term tree breeding and improvement programmes (species and provenance trials). Other traditional forestry research areas such as policy, management, economics and utilization have received less attention.

The opportunities for forestry research in North Africa and the Near East have been outlined in a background paper for the International Task Force on Tropical Forestry Research (El-Lakany, 1988). The research needs and opportunities discussed were related to the role of forestry in sustainable agriculture, fuelwood and energy, conservation of biological diversity and industrial forestry. Such priorities are still valid in spite of recent changes in international emphasis.

CONSTRAINTS TO FORESTRY RESEARCH

Forestry research in the N.E. suffers from several multidimensional constraints, some of which are common to most developing countries, but others are peculiar to the region. These constraints can be discussed in terms of four interrelated categories: i) Information, ii) Human Resources, iii) Institutions and iv) Financial Resources.

i. Information

The availability of information is becoming less problematic due to the recent revolution in communications. The majority of Forest Research Institutes (FRIs) of the N.E. have access to worldwide written and electronically transferred information. Nonetheless, the benefit of such voluminous information is curtailed in many FRIs due to one or more of the following reasons: (a) results or experiences are drawn from countries or situations with little relevance to the N.E., (b) researchers are unable to make full use of the information due to language problems, inability to use modern devices, or deficiency their background knowledge (c) information is compiled centrally and not circulated to field stations. Another deficiency in several FRIs in the N.E. is the reluctance to document and publish the results of local research. This is due to lack of funds and avenues, changes of personnel, or inability of some researchers to write research papers.

ii. Human Resources

Several of the N.E. countries have large numbers of forestry researchers, while others have few. But mere availability of forestry researchers is not sufficient. The quality of researchers is often more important. Many FRIs in the region have highly qualified personnel as far as academic degrees (MSc and PhD) are concerned, but some lack proper training in devising, conducting and interpreting forestry research. Some are trained in specific fields and become so specialized that they are unable to integrate into multi-disciplinary forestry research. Management of FRIs or research projects in the N.E. is often entrusted to forestry researchers based on seniority or political affiliation. Some of them may turn out to be successful managers, while others may fail due to lack of proper training in research management (El-Lakany, 1989). On the other hand, many FRIs in the N.E. suffer from a shortage of well trained research assistants, who are as important to the research process as the researchers themselves. All personnel engaged in forestry research in the N.E. need training of one type or another. Continuing education in the form of study tours, seminars, workshops and specialized courses are vital for the development of the forestry sector.

iii. Institutional Aspects

Institutional constraints to forestry research in the N.E. include the fact that most FRIs lack research planning. Intra- and inter-institutional communications are also weak, between researchers and management, between researchers themselves, and between forestry and other disciplines

such as agriculture, sociology, economics. Furthermore, many FRIs lack contacts with decision makers and field foresters, which puts them at a great disadvantage.

It has been noticed recently that in certain N.E. countries, where unemployment is high, large numbers of young graduates are assigned to FRIs to be trained as researchers, for internal political reasons. Such a practice imposes more strains on the FRIs.

iv. Financial Resources

The level of financial expenditure in forestry research in the N.E. is believed to be low relative to the total budget of forest operations, production and trade, although unfortunately no statistics are available. There is heavy dependance on external funding from bilateral and multilateral agencies.

One problem with external funding in several countries of the N.E. is the lack of coordination between international development assistance agencies. It is frequent to find several agencies funding the same research topic and the same researchers in the same country or institute. Therefore, coordination among donors is very essential. Also, the low level of incentives paid to local researchers relative to the compensation of expatriates, even when the local staff act as full-time counterparts to foreign advisors, creates a lot of difficulties to both parties.

Most of the constraints to forestry research in the N.E. described above can be overcome through organized support programmes and regional, sub-regional or national research networks. Practically all the ingredients for successful networking exist in the region including the researchable problems, need for coordinated activities, personnel, facilities and, present and potential funding. On the top of that, political will for tackling environmental problems climbed to new heights after UNCED 92, and the time is ripe to seize this opportunity before all the excitement fades away.

PROSPECTS FOR FORESTRY RESEARCH SUPPORT PROGRAMME FOR THE NEAR EAST COUNTRIES

Research networks have proved to be a good mechanism for promoting high quality research and for avoiding unnecessary duplication and waste of human and financial resources. It is proposed to initiate a coordinated support programme for some FRIs in the N.E. following the mechanism that led to the establishment of FORSPA (See Proceedings of Pre-Implementation Seminar, Advisory Group Meeting, FAO, 1992).

The proper procedure leading to the creation of the proposed network would begin by convening a seminar or a workshop which will bring together forestry researchers, forest administrators, researchers from allied fields, and representatives of funding agencies and FAO. This forum is expected to set the priorities and design the "modus operandi" for the network. The recommendation of this "Expert Consultation" may be presented to the next N.E. Forestry Commission for further discussion and endorsement.

It is envisaged that the network proposed here will have special characteristics with respect to priorities, regionality, training, subcontracting to national FRIs and coordination with existing networks and International Centers (e.g. ICRAF and CIFOR).

The priorities suggested for the forestry research support programme in the N.E. are described in the next section. It is felt however, that due to the ecological, social and economic heterogeneity of the region, it will be appropriate to operate the proposed Network on a sub-regional basis viz: (i) North Africa, (ii) Middle East and (iii) West Asia/East Mediterranean. The proposed Network should place most emphasis on decentralized activities and subcontracting to national FRIs. Training of junior researchers in specific fields, and of senior managers in the planning of research and the coordination of multi-disciplinary research teams, is needed, as well as documentation of past and future research results. The proposed network should support and strengthen but not duplicate ongoing forestry research.

SUGGESTED AREAS (THEMES), AND PRIORITIES FOR FORESTRY RESEARCH IN THE NEAR EAST REGION

The themes or areas of forestry research needed and applicable to N.E. countries fall more or less within those envisaged for CIFOR and proposed for FORSPA. They include:

- i) Watershed management (upstream/downstream interaction), including management of natural forests
- ii) Land use planning and reforestation of degraded sites
- iii) Ecosystem conservation and maintenance of bio-diversity
- iv) Sustainable plantation forestry (including tree improvement and management of plantations)
- v) Agroforestry and agro-silvo-pastoral systems including non-wood forest products (NWFP) and non-fodder range products (NFRP),

- vi) Promoting community participation in forestry development.

The five research areas identified for CIFOR (ACIAR, 1992) which cover practically all forestry disciplines, are all applicable to the N.E. region.

PRIORITIES

As indicated before, setting the priorities for forestry research in the N.E. sub-regions will need a special "Expert Consultation". Meanwhile, two research areas are envisaged, based on personal experience in the N.E. regions, viz: i) Forest Restoration Research, and ii) Sustainable, Multiple-use Forestry Research. Both would include integrated, multi-disciplinary research. The following research topics are suggested for the two areas:

(i) Forest restoration

- A Rehabilitation of catchments: upstream/down-stream interrelationships, biological and engineering measures to halt or reduce soil erosion
- B Reforestation and afforestation: production and trial of genetically improved material, tree performance under stress (stress physiology), use of degraded land and use of low quality (waste and saline) water for irrigation, microbial symbiosis, natural stands and plantation management and utilization, sand dune stabilization, and use of stabilized areas
- C Conservation of bio-diversity

(ii) Sustainable multiple-use forestry

- A Sustainable forms of integration between forest trees and agriculture (field crops, fodder crops, horticulture, windbreaks and shelterbelts)
- B Forest/rangeland management and improvement; including management and marketing of NWFP and NFRP
- C Socio-economics of multiple-use forests:

CONCLUDING REMARKS

International support for forestry research in the N.E. region has long been neglected relative to other parts of the world due to the misconception that forests play an insignificant role in the socio-economics of its countries. Actually, even if the forests have a minor economic value, in terms of monetary returns in some N.E. countries, their significance to the livelihood

of the people and to environmental stability cannot be neglected. Aside from limited forest areas managed (or sometimes mismanaged) for timber production, the vast majority of the forests (or what remained of them) are essentially catchment areas exploited collectively as a source of fuelwood, fodder and NWFP. Proper forestry research must be conducted prior to, or at least concurrent with, forestry development projects in the N.E.

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INFORANDES

by

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What is Inforandes?

A non profit, private foundation dedicated to helping local institutions do research in forestry and the environment in the Andes.

What countries does it cover?

Ecuador, Colombia, Perú, Bolivia, Venezuela, Chile and Argentina.

How is it organized?

- Ecuador leads the development of Inforandes.
- The Ministry of Agriculture of Ecuador has set up a Regional Office.
- Statutes for Inforandes have been approved by Ecuador, Perú and Bolivia.
- National research committees have been organized in each of these countries.
- Argentina, Chile and Venezuela have expressed a strong interest in participating and are taking part in start up activities.
- Currently, 18 institutions from six countries mentioned are members of Inforandes.

How does Inforandes help its members?

Research in forestry and the environment is on the decline in the Andean Region. Research institutions have five main problems:

- inadequate planning
- inadequate research methods
- shortage of trained personnel
- lack of facilities and money

Through networking local institutions can help each other lessen some of these problems.

Information exchange and training takes many forms: newsletters, visits, training courses, etc.

By jointly executing research programs, institutions can share expertise and reduce costs.

A strong lobby is needed to generate the financial support for research programs. Networking can help the lobby effort.

In what stage of development is Inforandes?

- It is in the planning stage.
- Research priorities have been established:
- Forest policy: some policies facilitate the destruction of forests. Research is needed to develop guidelines for controversial issues such as land tenure, colonization, markets, forest conservation, etc.
- Seeds and genetics: trees growth is slow in the Andes. This situation can be improved through genetic engineering and the establishment of seed banks.
- Agroforestry/social forestry: little is known about native species used in agroforestry practices in the Andes. New multiple use species are needed, particularly those that are nitrogen fixing.
- Forest and plantation management: not much is known about the management of native forests and forest plantations. If production levels of these are to be raised, sound management practices must be introduced.
- Production, use and sale of forest by-products: Andean communities depend on the forest for many other things besides wood. Medicines, dyes, fodder, humus and fibres are just a few of the non woody products that people use. Very little information is available on these local products.

Who supports Inforandes?

The following aid agencies are participating in the development of Inforandes: FAO, IUFRO, COTESU, CIFOR and Dutch aid.

- FAO is helping organize Inforandes through its regional project: desarrollo forestal participativo en los Andes (Quito).
- IUFRO has aided Inforandes to design its research priorities and select its members.
- COTESU is financing a study to analyze experiences and efforts in the region concerning forest genetic and seed production.

- CIFOR has helped Inforandes design a project to help plan its research programmes.
- The US Forest Service has offered to help Inforandes develop a research programme in forest management, and the Dutch have shown interest in agroforestry research.

What is the problem?

Inforandes needs a leader and a small amount of money to help plan its future.

A request:

Help support Inforandes. Provide it with a leader. Give this leader money to operate. Help Inforandes design and carry out its priority research activities. Let's band together to make Inforandes work.

CIRAD-FORET RESEARCH SUPPORT NETWORKS

by

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Abstract

CIRAD was established in 1984 by the consolidation of French agricultural, veterinary, forestry, and food technology research organizations for the tropics and subtropics. CIRAD-FORET, formerly called CTFT, is one of the seven departments of CIRAD. CIRAD-FORET presently has bilateral research agreements with various countries in Africa and Asia. In addition, it fosters regional cooperation in Africa through CORAF (Conference of Representatives of African Agricultural Research). It is also active in other research networks in collaboration with FAO, ITTO and other international agencies.

CIRAD-Forêt (CTFT) IN FEW WORDS

CIRAD (Centre de Coopération Internationale en Recherche Agronomique pour le Développement) is a French research organization that specializes on agriculture in the tropics and subtropics. It is a state-owned body that was established in 1984 following the consolidation of French agricultural, veterinary, forestry, and food technology research organizations for the tropics and subtropics.

CIRAD's mission is to contribute to the development of these regions through research, experimentation, training and the dissemination of scientific and technical information.

The Centre employs about 1850 persons, including 920 senior staff. Its budget is approximately 200 million US dollars, half of which is derived from public funds.

CIRAD-Forêt, formerly called CTFT, created in 1949 is one of the seven departments of CIRAD. Its budget is 18 million US dollars. It employs more than 200 people, 96 of them being stationed overseas. Among the ninety senior researchers specialized in forestry or wood technology, half carry out research activities in about twenty tropical countries and the others work at the headquarters. The activities are organized into four Research and Development Programmes:

- The Agroforestry Programme is concerned with the management of trees in agroforestry and rural forestry production systems, and the management of water and soil.
- The Forest Management Programme is concerned with the dynamics of natural forests and plantations, and the creation, protection and utilization of tropical wood formations for sustainable production of wood for construction, service, industry and energy, according to local needs. In humid forest zones, priority is given to the management of natural forests with the following targets: conservation of the ecosystem, conservation of genetic resources, sustained production.
- The Tree Improvement Programme deals with a few species, considered of high priority, and the symbiotic associations of some of them. The aim is the improvement of the productivity of plantations, the maintenance or the restoration of soil fertility and the use of derelict lands. It is concerned at the same time with the conservation, the evaluation and the improvement of the genetic resources of trees and their associates.

- The Wood Technology Programme deals with the main uses of tropical wood:

- wood as a material (sawn timber, veneer...)
- wood for energy

This programme interests the economic sectors of both producer and consumer countries. This programme was the first one established when CIRAD-Forêt was created in 1949.

- All the activities of the programmes are supported by various services such as Documentation, Biometry, Training (for young French and foreign research workers). The Publication Service publishes a quarterly journal: Bois et Forêts des Tropiques (B.F.T).

BILATERAL COOPERATION

Memoranda of understanding signed with host governments for bilateral cooperation are followed up by detailed research agreements which serve as frameworks for work contracts for expatriate scientists. Annual meetings for the evaluation and planning of programmes are held with CIRAD-Forêt's partners, as stipulated in the memoranda of understanding.

It must be pointed out that the CIRAD-Forêt scientists work within the national agricultural research organizations (NARs). They stay for several years on site and they can share the support of the headquarters services of CIRAD-Forêt (Documentation, Biometry, Training, Publication...) with their partners.

The countries where CIRAD-Forêt is working within NARs are the following:

- Burkina Faso (IRBET)
- Cameroon (IRA)
- Indonesia (AFRD)
- Madagascar (FOFIFA)
- Malaysia (Sabah Foundation and FRIM)
- Senegal (ISRA)
- Vietnam (LIKSIN)

CIRAD is moreover in the process of establishing new agreements for scientific cooperation in the Congo (CNRF) and in the Ivory Coast (IDEFOR), where several scientists are already working.

REGIONAL COOPERATION

CORAF

The Conference for Representatives of African Agricultural Research (CORAF) provides a mechanism for cooperation in agricultural research, a forum for consultation and for exchanges of information and experience. CORAF relies upon the mutual will of its member organizations to strengthen national agricultural research systems in African countries and to develop an African scientific community, through team work and the pooling of resources and results.

Each year, CORAF brings together representatives of agricultural research organizations from sixteen countries: Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Gabon, Guinea, Madagascar, Mali, Mauritania, Niger, Senegal, Togo and Zaire, and representatives of associate agricultural research organizations. The Conference can elect new members and associate members.

The aims of CORAF are to promote:

- cooperation, consultation and the exchange of information between member organizations
- the definition of common research aims
- the drawing up of joint research projects
- the creation, stimulation and development of regionally-oriented associative networks and research teams
- consultation with international agricultural research centres, regional and international organizations and sponsors.

The different institutional and organizational elements making up CORAF are:

- the Plenary Conference
 - the Steering committee
 - the executive secretariat
 - the associative networks
- and CORAF can call an ad hoc donors committee.

Associative networks

An associative research network is a group of researchers working together on the same research topic, acknowledged by CORAF as a priority. In this respect, the network's objectives are as follows:

- to strengthen existing national agricultural research systems, stimulate

- them and give them a regional and international dimension
- to promote the acquisition of scientific knowledge and the utilization of results
 - to encourage exchanges between the different national research teams
 - to encourage consultation with International Agricultural Research Centres (IARCs) and regional and international organizations,
 - to prepare and submit projects for outside funding
 - to encourage the assessment of results under different agro-ecological and socio-economic conditions
 - to facilitate the formation of multi-disciplinary teams, researcher training and supervision.

In order to prepare the creation of networks, several working parties have been devised on forestry matters.

The first federating theme deals with the management of natural forests.

A workshop was held in Côte d'Ivoire in February 1991. It gathered all countries involved but Zaïre. Three matters of priority have been selected:

- Surveys to define and evaluate timber natural resources
- Productivity and growth dynamism in natural populations
- Survey of management techniques for natural formations.

A coordinator for the network and a correspondent were elected, and project managers designated.

A second uniting theme deals with agroforestry. A similar approach (Ouagadougou workshop, June 1991) was followed to define conceptual basis and priority theme areas, as well as implementation strategies. The responsibility for each research area has been entrusted to one or several countries.

Other networks

The placement of CIRAD-Forêt scientists in national centres for forestry research has promoted the creation of many formal or informal networks, which can call upon CIRAD headquarters for assistance.

These networks include:

- Collaboration between with many national research centres in field work on genetic resources, with Nogent Seed Laboratory giving logistic support
- Assistance to CILSS, through Sahel forest seeds project (FAO/Cirad-Forêt agreement)

- The Preservation and Rational Use Programme for West African forest ecosystems involving 7 countries, to study forest resources, fauna, and flora in selected forests areas, in order to implement an exemplary and sustainable management
- The "ITTO - Secondary Species" network of ten countries dedicated to the study and valorisation of forests products through the publication of technical sheets and the establishment of a computerized data bank.

INTERCONTINENTAL COOPERATION

While initially active mainly in Africa, CIRAD-Forêt has extended its activities towards Latin America and South-East Asia. This has created fruitful relationship between continents, as shown in these examples:

"Study and management for tropical rain forests ecosystems" Network

As early as 1976, CIRAD-Forêt contributed to the implementation of a network of research devices studying tropical rain forest dynamics in order to answer questions on tropical forest ecosystems, regeneration and biological diversity after logging.

This Network has experimental plots covering nearly 1800 hectares. At this stage, 7 countries are involved:

- Côte d'Ivoire (SODEFOR)
- Central Africa Republic (ONF, National Forests Office)
- Brazil (INPA)
- Gabon (Direction des Eaux et Forêts)
- Congo (SNR/Congo Timber Office)
- Indonesia (AFRD/PT INHUTANI I)
- French Guyana (INRA-ENGREF-ONF-ORSTOM)

Implementation in French Guyana, in the framework of a European programme currently under preparation, will be the focal centre of the system. Exchange of researchers, the first analysis of results, and methodological support from CIRAD-Forêt headquarters are already giving real life to the Network.

Tree Improvement Networks

There are large opportunities for inter-regional exchanges and networking. For instance the recent collaboration on timber species in Malaysia greatly benefits from the expertise that CIRAD-Forêt's researchers have developed in the Côte d'Ivoire. The plantations of Acacia mangium to enhance soil

fertility will certainly benefit from the large improvement programmes developed on this species in Asia. This inter-regional collaboration can also be very fruitful for the exchange of germplasm. CIRAD-Forêt has a joint programme on neem (*Azadirachta indica*) with the Forest/Fuelwood Research and Development (F/FRED) network on multipurpose trees whose headquarters is in Thailand. This species originates in Asia and has been introduced in Africa at the beginning of the century. It is now widely spread in Africa and largely used for its wood. To enlarge the genetic basis of the species in Africa seed collections are planned both in natural populations in Asia and in landraces in Africa; a network of trials will be established. For this project CIRAD-Forêt is working in collaboration with the "Comité Permanent Inter-Etats de lutte contre la sécheresse dans le Sahel" (CILSS) in west Africa in order to facilitate the links at the regional level.

CONCLUSION

CIRAD-Forêt has for many years developed links with a vast number of those involved in forestry research in the tropics. Limited in the beginning to the French-speaking Africa, its scientific activities have extended to the five continents. They are based on an effective partnership, involving the exact definition of research programmes and of the means to be mobilized. In order to be successful, research programmes on development need the right environment, which can be found in "regional cooperative research bases". Responsibility is shared with other partners, so that stability and efficient management ensure favourable working conditions.

It is our wish in CIRAD-Forêt that CIFOR makes use of those formal or informal networks CIRAD-Forêt helped to create, notably, but not exclusively, in French-speaking areas. This seems perfectly feasible, if this new Centre is, as intended, willing to let research work be undertaken by existing bodies, instead of doing it by itself. Its task will anyway be heavy enough, and exhilarating enough, as it will have to coordinate a lot of on-going projects, to circulate information and to convey coherence to the many initiatives produced by the forestry sector in the warm regions.

RECENT DEVELOPMENT OF NETWORKS IN TROPICAL FORESTRY RESEARCH

by
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Abstract

This paper describes Japanese efforts in the development of tropical forestry research networks, with particular reference to BIOREFOR (Biotechnology Assisted Reforestation Project) and RETROF (Research Association for Reforestation of Tropical Forest). A unique feature is the involvement of the Japanese private sector in these networks.

INTRODUCTION

Japan has been active in tropical forest research for more than 20 years, mostly through bilateral arrangements made by the governmental organizations TARC (Tropical Agriculture Research Centre) and JICA (Japan International Cooperation Agency).

Recently, the Multilateral Cooperation Division, Ministry of Foreign Affairs, which handles all multilateral cooperation funds for Japanese government, has taken an initiative to promote international cooperation on tropical forestry research through the activities of IUFRO/SPDC. In addition, the Multilateral Cooperation Division, representing the Japanese government as an international donor in the CGIAR system, has positively endorsed the establishment of the Centre for International Forestry Research (CIFOR). CIFOR will be the priority organization to be supported by the donor community. However, other satellite network organizations are necessary for CIFOR to be effective.

The Ministry of Foreign Affairs may support IUFRO/SPDC activities for at least a few years until CIFOR comes into full operation. With these prospects, IUFRO-Japan took an initiative to establish a research network for Dipterocarpaceae in Asia-Pacific region as an activity within SPDC. This network is named BIOREFOR (Biotechnology Assisted Reforestation

Project).

Another international research group for tropical forestry research has been established by research institutes of private industries in Japan and various counterparts in tropical countries. It is called the Research Association for Reforestation of Tropical Forest (RETROF). RETROF is partly supported by the Forestry Agency of Japan. The initiative and actions taken by the Forestry Agency were timely and imaginative, because private industries possess strong research institutes with many advanced technologies; these technologies can be adapted for the reforestation of tropical forests. Particularly, most industries including heavy industries have now developed biotechnology sections in their research organizations. In addition, some technologies unrelated to forestry sometimes may be useful for the development of new methods in forestry. The activities of BIOREFOR and RETROF are summarized below.

BIOREFOR (BIOTECHNOLOGY ASSISTED REFORESTATION PROJECT)

BIOREFOR was established at a pre-workshop in Bogor, Indonesia in March, 1991 by the initiative of IUFRO/SPDC and IUFRO-Japan.

Objective

The purpose of the network is to promote exchange of information on fundamental research on Dipterocarpaceae and other species in order to restore natural forests. Particularly, tissue culture, micropropagation, conventional vegetative propagation, flowering patterns, growth characteristics of seedlings, and mycorrhizal physiology have been emphasized. By the exchanges of information particularly through symposia and workshops, young scientists actually engaged in research will be stimulated and benefited by exposure to better techniques and excellent research results. Various fields of fundamental sciences such as physiology, ecology, biotechnology, and genetics of Dipterocarpaceae will be included in future discussion and these findings will be synthesized to develop new technologies for the management of dipterocarp forests.

BIOREFOR organization

BIOREFOR is registered as a non-government organization for research networking in the study of Dipterocarpaceae, and it is recognized by the Japanese government as a non-profit organization under the Foundation for Advancement of International Sciences (FAIS). FAIS is an income tax

exempted organization, therefore, tax exemption status has been granted to BIOREFOR by the Government of Japan. This is important for fund-raising purposes.

The Secretariat Office was established in Tsukuba, Japan. Presently, Dr. F. Kobayashi, the former director general of Forestry and Forest Products Research Institute, is appointed as the president. Dr. T. Kira and Dr. S. Sasaki are serving as the vice presidents. Dr. K. Suzuki, Dr. T. Mori, Dr. T. Kawahara, and Mr. K. Murakami are nominated as members of the Executive Board. In addition, a few members from the Asia-Pacific region will be appointed in the Executive Board. Also, an advisory board by members of private industries is contemplated for fund raising.

Resources

A significant part of the activities of BIOREFOR are supported by the IUFRO/SPDC fund contributed by the Japan Ministry of Foreign Affairs. Support is also provided by the Commemorative Association for the Japan World Exposition, Japanese Forestry Association, and private industries. Further efforts are needed to secure operational funds if BIOREFOR intends to expand its activities in the future.

Activities

The first preliminary workshop was held in Bogor from 26 to 28 March 1991. Research scientists from Indonesia, Japan, Malaysia, Papua New Guinea, Philippines, Sri Lanka, Taipei China, and Thailand participated in the workshop. This workshop recommended the establishment of a research network for Dipterocarpaceae. At this first meeting, the current status of fundamental studies on Dipterocarpaceae was evaluated. With these processes, mycorrhizal physiology and tissue culture techniques were taken as main topics for the next meeting in Japan.

The second symposium was held in Tsukuba Science City from 18 to 20 May 1992, and over 300 people participated. Technical sessions were divided into two sessions: propagation of Dipterocarpaceae, and mycorrhizae of Dipterocarpaceae. Many good reports were presented in each session. Particularly, the progress of tissue culture techniques for Dipterocarpaceae was amazing. It was a good occasion for young researchers to exchange their techniques and ideas. Participants also visited the Forestry and Forest Products Research Institute, and the Research Institute of Sumitomo Forestry Co. The research facilities in these Institutes are outstanding and discussions in the laboratories were very fruitful.

The organizing committee felt that this type of the symposium needs to be continued, and expressed the committee's intention and efforts to keep BIOREFOR active.

RETROF (RESEARCH ASSOCIATION FOR REFORESTATION OF TROPICAL FOREST)

This is one of the unique research networks established by private enterprises in Japan. Japanese Mining and Manufacturing Technology Law permits the formation of a research association among various private enterprises to develop a specific new technology. Also, the Law allows the government to subsidize a part of developmental investment for the new technology. This Law was adopted for the development of a research association for tropical forestry. The Forest Agency proposed a budget for the research association and was allowed to subsidize one half of the research budget in the association for the 5-year period from the fiscal year 1991 to 1996. With this budget approval, private enterprises were invited to join the research association to carry out research on tropical forestry. About 20 companies enquired, and proposed their own research interests. The Forest Agency selected 10 companies suitable for the purpose of the association, and in October 1991, the Research Association for Reforestation of Tropical Forest was established at least for 5 years.

Objectives

The research objectives of RETROF are listed below. Also, the names of the member companies are attached to each research objective.

1. Development of supporting technology for reforestation.

Development of technology for mass production and supply of nursery stock.

Tissue culture:

Komatsu Ltd. (Mainly dipterocarp and other indigenous species)

Oji Paper Co. (Fast growing species)

Sumitomo Forestry Co. (Dipterocarps)

Toyota Motor Corp. (Fast growing species)

Tree breeding by genetic engineering:

Toyota Motor Corp. (Stress tolerances)

Propagation by cuttings:

Ishinomaki Plywood Manufacturing Co. (*Shorea albida*)

Development of new nursery materials.**Coating materials:**

Gifu Shellac Manufacturing Co. (Seed and seedling coatings)

Soil micro-organisms:

Kansai Environmental Engineering Centre Co. (Mycorrhizal isolations)

Sumitomo Forestry Co. (Mycorrhizae and development of potting mixtures)

Fibre materials:

Toyobo Co. (Use of new fabric materials for pots, nursery materials and water containers).

2. Application of technology in the tropical regions.**Assessment of materials in plantations:**

Nissho Iwai Corp. (On site tests)

Assessment of industrial plantations:

Nissho Iwai Corp. (Growth performance)

Assessment of soil fertility:

Oji Paper Co. (soil analysis)

Assessment of Dipterocarp plantations:

Sumitomo Forestry Co. (Field trials).

3. Establishment of social forestry systems and development of technology for multipurpose tree species.**Shellac producing tree species:**

Gifu Shellac Man. Co. (On site trials for trees and the scale insect)

Dipterocarps with fruit trees:

Sumitomo Forestry Co. (Introduction of fruit trees in plantations)

Soil improvement in tea plantation:

Mitsui Norin Co. (Use of tea trees in poor soil)

Fundamental researches together with applied researches are well blended in the objectives. Also, private industries are concerned with social forestry issues.

RETROF organization

At present, the following 10 companies are members of the research association.

1. Gifu Shellac Manufacturing Co. Ltd.
2. Ishinomaki Plywood Manufacturing Co. Ltd.
3. Kansai Environmental Engineering Centre Co. Inc.
4. Komatsu Ltd.
5. Mitsui Norin Co. Ltd.
6. Nissho Iwai Corporation
7. Oji Paper Co. Ltd.
8. Sumitomo Forestry Co. Ltd
9. Toyobo Co. Ltd.
10. Toyota Motor Corporation.

Mr. Kawake, the former President of Oji Paper Co. is appointed as the President of the Association. The Association is managed by a Board of Directors. The Chairman of the Board of Directors is nominated by the Forestry Agency. Presently, Mr. Nomura, the former Director of the Regional Forest Office is managing the Association as the Chairman. Also, the Advisory Committee chaired by Dr. Sasaki is established to give technical advices as well as to check the progress of research programmes. The Association has its Secretariat Office in Tokyo, which is responsible for budget proposal for each fiscal year, the allocation of research funds, the dissemination of information, the arrangement of meetings, accounting and finance.

Researches proposed as above are carried out in each company's own research facility and overseas experimental sites. Generally to secure the overseas experimental sites, each company makes a contract with a research organization in the respective country. This process of contact with overseas organizations is advised by the Secretariat Office of the Association. Gifu Shellac has a cooperative research contract with the Royal Forest Department of Thailand. Ishinomaki Plywood made contact with Sarawak Forestry Department to obtain permission to carry out studies on the swamp dipterocarp species, Shorea albida. Their experimental site is located in the forest concession of their business counterpart in Sarawak. Komatsu Ltd. approached the Ministry of Forestry, Indonesia and established cooperative research work with the Forest Research Institute in Bogor, Indonesia under the Research and Development Agency, Ministry of Forestry. Similarly, Sumitomo Forestry

has established an experimental site in East Kalimantan, Indonesia in cooperation with Ministry of Forestry, Indonesia. In addition, the subsidiary company of Sumitomo, P.T. Kutai Timber Indonesia is managing an experimental site. Mitsui Norin has an experimental site in Sulawesi, Indonesia. Nissho Iwai has established plantations in New Britain Island in Papua New Guinea within its concession area. With these activities, the research network in RETROF is expanding remarkably.

Resources, budget, and activities

Each company provides its own research facilities. During the 5 year-period in which the Government subsidizes, for each fiscal year, the Forest Agency proposes a budget for RETROF. This proposal is made in consultation with RETROF Secretariat Office. The budget was about 100 million yen (US\$800,000) for 1991, and 200 million yen (US\$ 1,600,000) for 1992. The Forest Agency expects an increase in the RETROF budget up to 386 million yen (US\$ 3,000,000) in 1993. Within the budget framework, each company proposes its own research budget for a year. If the proposal is approved by the Advisory Committee and the Board of Directors, the company pays half of the budget and carries out the research. Therefore, research budgets are not evenly distributed to the member companies, because the budget proposals are different among the companies. In 1992, some companies are spending more than US \$ 300,000, with \$ 150,000 subsidized by the Government. If research spending exceeds the proposed budget, the company is responsible for the exceeding part of the budget.

At least two meetings are held in a fiscal year to discuss research results. Therefore, the members of RETROF are mutually well informed of research progress of other members. Sometimes, member companies form cooperative research projects voluntarily. Particularly in the case of RETROF, the member companies are open in their attitude to the research results as innovative findings of the research are not directly related with earnings of the member companies.

Most companies have already started field experiments. A significant result was reported by Komatsu. For the first time, they were successful to induce roots on small tissue-cultured shoots of Dipterocarpaceae. Sumitomo Forestry and Kansai Environmental Engineering Centre have been isolating mycorrhizal fungi and inoculating the fungi to dipterocarp seedlings. Toyobo built a small pond for water storage in the forest by using the specific materials developed by the company. Gifu Shellac is a unique chemical company which deals with a scale insect. The scale insect produces a wax (shellac), which is used in various products such as paints

and medicines. The company tries to promote the production of shellac with the cooperation of farmers. Oji Paper Co has a strong research institute for forestry and established tissue culture and cell fusion techniques for Eucalyptus.

The research network of RETROF is expanding, as the member companies initiate cooperative researches in the tropical countries. They are making good contacts with the researchers and administrators in the tropical countries. Also, the member companies attend meetings and symposia held by BIOREFOR, TARC, JICA and ITTO. In fact, the researchers in RETROF made great contributions to the BIOREFOR symposium held in Japan.

RESEARCH SUPPORT FOR THE SADC REGION¹

by

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Abstract

A two-year research planning exercise has been completed in the SADC region which covers Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, Swaziland, Tanzania, Zambia and Zimbabwe, with technical assistance from FINNIDA. This has resulted in a National Forestry Research Plan for each country, and a Regional Forestry Research Plan for SADC.

INTRODUCTION

A major planning exercise in forestry research has been carried out in the SADC region (Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, Swaziland, Tanzania, Zambia, Zimbabwe) during 1991 - 1992. This two-

¹ SADC, Southern African Development Community, formerly SADCC, Southern African Development Coordination Conference

year planning project is a response to the widely recognized need for strengthening of research in this field and the respective institutions in the SADC countries. The project has produced:

- National Forestry Research Plans
- Project proposals on Strengthening of National Forestry and Forest Products Research
- Regional Forestry Research Plan.

Along with the planning exercise, the research managers have gained knowledge and experience on strategic planning. In the near future, they are expected to learn more while attempting to implement the plans. It remains, however, to be seen whether the exercise has succeeded also in raising the priority given to forestry research by various stakeholders, including the national governments and donor agencies.

The project is being implemented by the SADC Forestry Sector Technical Coordination Unit (FSTCU). Technical assistance is provided by the Finnish International Development Agency (FINNIDA) through Indufor Ltd.

THE PLANNING EXERCISE

The project was based on the following strategic features:

- research needs of the present and potential users of research results as the starting point for research planning
- the service role of forest research emphasized
- effective means of dissemination of the existing knowledge and research results emphasized
- appropriate balance between basic and applied research
- multi-disciplinary approaches in research whenever appropriate
- division of work between SADC countries and the establishment of necessary commitments by the governments and institutions concerned
- training and transfer of skills
- donor participation in forest research in the region as well as a better coordination of existing and planned donor inputs under the TFAP framework.

PROPOSALS

Justification for research cooperation in the SADC Region

All the SADC countries have common problems in developing sustainable utilisation and conservation of their forest resources:

- low productivity of agriculture, animal husbandry and forestry, all competing for the same land resource,
- diminishing natural forests due to the pressure on the land and unsustainable farming and forestry techniques,
- large areas of degraded or degrading lands which are mainly in the semi-arid or mountainous areas,
- poorly developed forest industries which cannot meet the local demand for forest products, not to mention generating of export earnings,
- dependency on a few exotic tree species cultivated in monoculture plantations for the raw material supply of the infant industry, and thus being vulnerable to pest and disease outbreaks.

These and other problems call for common solutions which could be found through research. Previous experience has shown that investments in applied research are often justified with normal decision-making criteria.

However, the forestry research institutions are rather weak in the SADC countries. Even in Malawi, Tanzania, Zambia and Zimbabwe, countries which have fairly well established forestry research institutions, the capacities and capabilities are limited. In other SADC countries, Angola, Botswana, Lesotho, Mozambique, Namibia and Swaziland, there is hardly any operational public forestry research institution. Therefore, long-term institutional strengthening in forestry research is essential in all SADC countries. Without national research capacity very little of applied research can be expected to materialise.

The first priority and principal strategic guide-line for mobilizing forestry research for sustainable resource management is strengthening of national forestry research institutions in the SADC region. Benefits from regional cooperation and collaboration can be expected only when there are existing activities, which are presently very few. However, regional approaches are needed in research work. In some cases, like in specialized training and data services, regional approaches are clearly beneficial.

Research objectives

The national institutions stress research collaboration in their strategies.

Similar national objectives and common problems provide a natural basis for cooperation. Some issues are common to all or almost all the countries, and come out very strongly in their national objectives. Among them are management of indigenous species, management of natural forests and woodlands, forest products utilization, wood energy, and integrated land use including agroforestry, as well as dissemination of research information and technologies, and institution strengthening.

Some important subjects have been specifically mentioned in several country objectives, but only implied in others. Tree improvement, rehabilitation of degraded lands, forest protection, environmental quality, education and training fall into this category.

In some cases stated objectives do not fully reflect the research programmes identified by the countries themselves. The programmes should derive from the objectives. However, because there are generally no government approved forestry research policies and objectives, such mismatch is perhaps inevitable. The provisional objectives stand operative until revised, and so do the programmes.

The overall regional research objectives must be developed around the issues of common interest. Based on the analysis of national plans the regional research objectives are proposed to be:

- i. Improved scientific, technical and socio-economic information for (a) increasing productivity of natural forests and plantations, (b) upgrading utilization of forest products, (c) planning, policy formulation, and (d) economic analysis of forestry operations and enterprises.
- ii. Improved knowledge on the natural forest and woodland ecosystems to improve their sustained management, as well as to maintain their genetic diversity.
- iii. Improved knowledge on important indigenous tree species, their breeding and silvicultural techniques for propagation and production, and for enhanced sustainable utilization.
- iv. Improved knowledge on agroforestry and other production systems involving trees which sustain and increase agricultural production.
- v. Increased productivity of tree species for farm and community forestry through appropriate breeding, silvicultural and socio-economic research.
- vi. Enhanced sustainable utilization of wood and non-wood forest products and improved dissemination of appropriate technologies.
- vii. Upgrade the role of trees and forests in environmental improvement

through conservation of soil and water resources, and rehabilitation of degraded lands.

- viii. Strengthened national research capabilities through training, improved physical facilities, research networking and other collaborative programmes.

Strategic guidelines

In the SADC countries the focus of research development should clearly be at the national level. Regional collaboration should have a supporting complementary role. Activities at the regional and national levels are distinct and must be recognized as such. Activities at the regional level should focus on

- data collection, storage and dissemination
- facilitating sharing of information
- fostering collaboration in research
- identifying common issues and developing appropriate programmes on them
- movement of germplasm
- promoting human resource development in specialized areas of common interest, eg. tissue culture, research methodology and project formulation
- organizing regional workshops and seminars.

If a regional institute is established, its mandate and programmes must be carefully formulated in order to avoid overlap with national institutions. SADC does not have such an institution nor is its establishment recommended in this plan.

Actual research should be preferably carried out at the national level irrespective of discipline. Scientific, technical and socio-economic programmes should all be implemented in the national institutions. This does not mean they must themselves carry out all research relevant to their needs. They cannot. Appropriate linkages with other institutions will permit taking advantage of research elsewhere and adapting it to local needs. Nor does it preclude a regional body from carrying out special studies on regional problems, such as pest and disease outbreaks, regional trade on forest products, or germplasm collection and exchange for comprehensive multi-locational testing. Even such studies must involve researchers at national level.

Based on the foregoing the following strategic guidelines for regional

research activities are suggested:

- i. Emphasize research at the national rather than regional level.
- ii. Start new regional activities only if strong committed leaders and lead institutions can be identified.
- iii. Make maximum use of the existing international cooperative arrangements rather than start a new one in the SADC region.
- iv. Promote research coordination at the level of committed scientists or active research groups.
- v. Ensure that collaborative research is problem oriented, applied in nature and multi-disciplinary in planning and implementation.
- vi. Promote utilization of local training institutions whenever possible, for developing manpower requirements in national institutions.
- vii. Encourage monitoring and evaluation of research performance.
- viii. Organize and disseminate the existing knowledge rather than start new programmes.
- ix. Promote effective dissemination of useful research results and technologies.

Regional proposals

In this plan, a set of research programmes and projects is proposed to be implemented at national-level through regional cooperation. They include both planned, on-going and new projects. They all focus on specific research problems which have regional relevance, while aiming at strengthening research capabilities on national level. In general, a fairly low-input research networking is proposed as the basic model for forestry research cooperation in the region. This involves selection of a lead institution with an operational research team active in a particular topic, and registration of active research teams interested in the same topic from other institutions of the region and mechanisms to establish exchange of information and experience.

The following regional programmes and projects are proposed:

Tree Improvement

- SADC Tree Seed Centre Network
- Tree Breeding

Production Systems

- Agroforestry Research Project Phase III
- Dry-zone Agroforestry Research Project

- Plantation Forestry Networks

Natural Forest Ecology and Management

- Sustainable Management of Miombo Woodland
- Networks on Sub-humid and Riverine Forests

Forest Protection

- Systems Design for Pest and Disease Monitoring in Forestry
- Establishment of Pest and Disease Monitoring and Information Services
- Integrated Control of Conifer Aphids in the SADC Region
- Control of Termites in Forestry

Rehabilitation of Degraded Land

Forest Products

- Wood Properties and Utilization Networks
- Non-wood Products
- Regional Beekeeping Information Centre

Policy and Socio-economic Studies

- Policy and Socio-economic Studies Networks

Training and Education

- Management Training
- Training in Research Methodologies
- Training in Communication and Media Skills

Information Services

- Forestry Research Information Services
- Forestry Research Data Banks

Implementation Arrangements

General

At the SADC-level, the SADC Forestry Sector Technical Coordination Unit (FSTCU) has the mandate to coordinate forestry sector and the Southern African Centre for Cooperation in Agricultural Research (SACCAR) to coordinate research in agriculture and natural resources. Thus, close collaboration of FSTCU and SACCAR is required in coordinating forestry research. It is, however, noted that research is better coordinated by the scientists themselves, and what is needed beyond this

is a powerful policy guidance unit.

Regional Coordination of Forestry Research

The proposed arrangement for regional coordination is as follows:

(i) FSTCU should provide coordination at SADC regional level. This will only be possible if FSTCU is strengthened by the provision of a Subject Matter Specialist (SMS) who can cover regional activities to support forest research. The SMS would have access to the Unit's support staff but additional support might be needed. The SMS would serve as both liaison and coordination officer for the research programme. Initially this officer would be funded internationally and later absorbed within the regional operational budget.

(ii) The SMS will support and pursue the implementation of this SADC Regional Research Plan and will also serve as secretary to a SADC Forestry Research Committee. The Committee would provide policy and priority guidance for the regional activities and address common issues in research development in member countries. Particularly the Committee would:

- discuss the national progress reports
- discuss the revisions in the national plans
- discuss research coordination to avoid duplicating of efforts
- identify and agree on regional forest research programmes and projects
- act as a steering committee for selected regional projects
- review the progress reports of regional projects.

The Committee would meet every second year and would be composed of the heads of forestry research of participating member countries.

(iii) The SMS will also support and monitor the implementation of the national forestry research plans of the SADC countries. Particularly, he would pursue adequate donor support to the implementation of the national plans.

(iv) Each regional research programme will have a lead institution in one country. The appropriate research unit in each lead institution will be strengthened. This strengthening will serve a dual purpose: (a) the research capabilities of respective units will be substantially and sustainably improved which will enable conducting relevant research work efficiently, and to meet the national research needs, (b) the strengthened research units will be in a better position to coordinate the respective regional research networks. The basic strategy in this regional research plan is thus

to increase the national research capacities first. Beneficial regional research cooperation is possible only when there is something to coordinate.

(v) At national level there will be a strong focus on national priorities. This gives member countries the mandate to link their national priorities with the regional action.

International Cooperation

IUFRO provides a significant set-up for international cooperation in forestry and forest products research. Several of the SADC member states are already members of IUFRO, and it would be beneficial and ideal for all SADC member states to subscribe for membership. This would entitle all countries to receive regular information, newsletters and communication from IUFRO Secretariat and the Working and Project Groups.

The establishment of the Center for International Forestry Research (CIFOR) also provides an opportunity for international cooperation. CIFOR aims at promoting the strengthening of national institutions, which is along the proposed direction of this SADC programme.

There exist several other opportunities for cooperation. Examples are the research projects that Oxford Forestry Institute, the Australian Centre for International Agricultural Research (ACIAR), and similar organizations are implementing on a voluntary basis without any subscription fees. Such facilities can and should be promoted within the SADC region, and FSTCU can provide the basis for cooperation.

At regional level, therefore, international cooperation can be promoted if SADC or FSTCU as an institution subscribes for IUFRO membership as well as establishes formal links with internationally reputed forestry research institutions. Where member states already have such linkages they should be encouraged to strengthen them.

Funding arrangements

The estimated cost of the implementation of the plan is:

National inputs	US\$ 2 765 000
Foreign inputs	US\$ 49 680 000
Total	US\$ 52 445 000

US\$19,000,000 is already committed for 3 projects. The remaining US\$ 33,445,000 is phased over ten years. Explicit prioritisation criteria has been applied in selection of the programmes and projects, as well as in phasing

them.

It is essential that member states should give full support to the national programmes first as they form the justification for regional activities. During this planning project, policy and decision makers were sensitized about the need to increase government financing of forest research programmes. Such support has started through an increase in the research budgets. National programmes should ideally be marketed by the countries themselves to attract bilateral donor funding with local contribution.

Regional programmes and networks will be promoted by FSTCU along with other sectoral programmes. The capacity of existing national forestry research institutions is limited both financially and materially. This makes the case for institutional strengthening very strong.

Donors are requested to consider supporting the implementation of this plan. Interested donors could provide support to one or several programmes.

IUFRO'S SPECIAL PROGRAMME FOR DEVELOPING COUNTRIES: TOWARDS THE FUTURE

by

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Abstract

This paper describes the evolution of IUFRO's Special Programme for Developing Countries (SPDC) from a proposal made at the IUFRO World Congress in Kyoto in 1981, to its establishment in 1983 as a 'bridging' programme pending a later international initiative, to its present status as an integral part of IUFRO. In this period, SPDC has established itself as a useful programme within the international forestry community.

Global concern over the state of the world's forests is a relatively new phenomenon. And only in recent years has attention been turned to the

plight of developing country forest research in general and to tropical forest research in particular. Although sporadic concern had been expressed previously, concerted dialogue was begun only during the 1970s and continued through the 1980s.

Notable milestones include the IUFRO World Congress in Kyoto, Japan in 1981 and the consequent establishment of IUFRO's Special Programme for Developing Countries (SPDC) in 1983, the implementation of the Tropical Forestry Action Programme (TFAP) in the mid-1980s and the Bellagio Conferences of 1987 and 1988 following which the decision was made to introduce a new forestry research institution within the CGIAR (Consultative Group for International Agricultural Research) system. The culmination of this activity has been the establishment of the Center for International Forestry Research (CIFOR) and, of course, UNCED (United Nations Conference on Environment and Development) in Rio de Janeiro this year.

While the concerns have been genuine, they have been driven by political as often as environmental interests. Further, there is not complete agreement between the developing world and the developed world as to how forest management and conservation activities should proceed. This has significant implications for research and causes concern for the donor community, the mainstay of many of the activities related to developing country forestry and forest research.

International donor community support for forest research in developing countries was given a modest boost with the agreement of the World Bank and UNDP (United Nations Development Programme) in the early 1980s to provide medium term funding for the SPDC. Hopes that a major impetus for research would materialize through the TFAP were not realized and it was not until the Bellagio Meeting of 1988 and the establishment of a CGIAR advisory committee that additional concerted action was taken to remedy a burgeoning need. The establishment of CIFOR promises to address many of the operational research needs of the tropics. And the bringing of the International Council for Research in Agroforestry (ICRAF) into the CGIAR fold holds much promise for the broadening of agroforestry research on a global scale.

The SPDC has been, essentially, an unstructured initiative under the IUFRO umbrella which has aimed to address developing country forest research needs in a modest way. Initially it was intended to be a bridging mechanism until the time that a formal international forest research institution (now CIFOR) was established. In the meantime, however, the SPDC has become recognized as an agency for assistance, has expanded

and extended IUFRO's presence in the developing world, and has attracted support from a good cross-section of the international donor community. Although the Programme has not been a large one, it has been effective and has provided valued service to the developing world.

A programme embracing forest research planning, training, and information services was developed very early in the life of the SPDC in response to needs identified by the developing countries. Progress varied amongst these several lines of activity in accordance with availability of funding, restrictions placed upon the use of funds by donor agencies, and the physical capability of staff to implement programme. Other programmes were implemented as resources allowed.

The search for funding has been a continuing struggle, as that provided by the principal donors was insufficient to sustain the full, albeit modest, programme. At times it appeared that the Programme might founder for lack of operating capital. Towards the end of the 1980s and into the 1990s the programme burgeoned through grants from the World Bank, UNDP and ODA (Overseas Development Administration of the United Kingdom) and from new sources of funding uncovered with considerable effort. Throughout the period in-kind support was obtained from the Government of Austria in terms of housing and facilities and some staff assistance.

The earned reputation of the SPDC as a principal source of support in the developing world is testimony to the effectiveness of the Programme and the diligence of its staff despite limiting funding and staff resources.

Because of the early understanding that the SPDC would be a bridge to a later international initiative, and because to some extent the expectations for the new international forestry institute were rather all-encompassing, it was generally believed that the SPDC would cease to exist once CIFOR came into existence. With the passage of time, however, and the enunciation of the scope and modus operandi of the new institute, the feeling grew within IUFRO that there was still a place for an SPDC operating under the aegis of IUFRO. This view has been nurtured and has been strengthened through several recent decisions by the Executive Board of the Union.

Earlier doubts within the Union itself, which were fed by a separation of the operation of the SPDC from the mainstream activities of the Union, have today been allayed in large measure. Over the past year and more, concerted effort has been undertaken to make the officers of the Union more aware of the SPDC and its programme and to instil an understanding of ownership of the SPDC by the Union. Concerted effort has been made to foster a sense of responsibility on the part of the Union for its

programme of assistance to developing country research.

In this regard, several noteworthy decisions have been taken by the Executive Board over the past year (1992). Firstly, in Chile in February of this year, the Board formally expressed its endorsement and strong support for the continuation of the SPDC within the Union. This was followed by two motions at the Board meeting in Poland this past August under which IUFRO rescinded the long-standing statement, dating back to the 1983 meeting of the Board (Brazil), precluding direct IUFRO support of the SPDC as a condition of its establishment, and then endorsed the notion of IUFRO assistance to the SPDC in obtaining essential support. Further, a committee was struck that would, among other things, consider mechanisms whereby resources for the ongoing core and technical programmes of the SPDC may be obtained.

Such decisions and pronouncements may seem somewhat cosmetic but they reflect significant changes in the official view of the SPDC on the part of the Board and, ultimately, on the part of the Union as a whole. IUFRO has come to grips with the programme it has housed but of which it has been sometimes reluctant heretofore to accept ownership. That sense of ownership is increasingly palpable and real.

Quite clearly the foregoing does not mean that IUFRO will now be the source of funding for the SPDC. The finances of the Union do not provide for wholesale support. However, it does place a level of responsibility on the senior officers of the Union to play a role in ensuring that the SPDC has resources to continue. New mechanisms of funding can now be sought in concert with IUFRO officials to supplement the funds which must still be obtained from the international community. It is expected that the good offices and personal influence of present and future officers will be brought to bear on the matter.

As one early example, the Union has just announced the implementation of the IUFRO Development Fund to support participation of developing and economically disadvantaged country scientists in meetings and events of consequence and value as well as to foster interchange opportunities. The first donations have been received for the fund and senior level solicitations are in progress to augment these promising beginnings. The fund will be overseen by a Board of Directors and will be administered through the SPDC. This initiative is a beginning for an area that has been difficult to support in the past by virtue of the donor community's reluctance to provide a fund for such activities.

Internal realignment has taken place within the SPDC as well. New operating and administrative procedures are in place to provide uniformity

of approach and to provide guidance for interactions with outside agencies, particularly with respect to contracting policies. New financial management procedures have been established as well as streamlined procedures for interactions between the SPDC and the IUFRO Secretariat with which the SPDC shares facilities in Vienna. In a concrete example, the first global audit of the SPDC financial accounts was undertaken for fiscal 1991 at which time it was indicated that financial procedures recently implemented were well developed and satisfied the needs of formal audit.

Finally, the SPDC is strengthening its outreach to the international community. Newsletter items and mailings are being produced regularly and a new SPDC brochure, once again a first, has been produced to bring the message of the Programme to the client and donor communities as well as to generally increase the awareness of the existence and purpose of the SPDC.

Clearly the SPDC is an agency in transition. How does all this assist in its primary mission of extending aid to developing country forest research and the strengthening of developing country research capability?

Evidence is strong that the international community has seen the SPDC as an independent agency. Many have been only vaguely aware, and some unaware, that the SPDC is, in fact, an arm of IUFRO. Further, there has been a perception within the international community that IUFRO merely houses the SPDC and that the SPDC does not enjoy the support of IUFRO's Executive Board. This has been a detraction from the SPDC's ability to attract funding. Also, the obtaining of funds for the SPDC has been left largely in the hands of SPDC staff. This has been effective to the extent that the Programme has been funded but the considerable influence of senior Union officers has only infrequently been brought to bear on resource solicitation. In many ways this has detracted from the ability of the SPDC to devote its energies to the implementation of programme.

As further evidence of its vested interest in the SPDC and its activities, the Executive Board has directed that a strategic plan be developed for the SPDC, a plan that will eventually be incorporated into an overall strategic plan for the Union which is in the early stages of preparation. The strategic plan for the SPDC is well advanced, a fact that is evidenced by much of the wording of this paper.

The mission of the SPDC needs now to be better articulated. It is based upon statements included in the Declaration and the attendant considerations and recommendations of the XVII IUFRO World Congress, Kyoto, 1981. Relevant amongst these are the following excerpts which some in this audience will immediately recognize.

"Forest research is necessary to develop the forest potential, to overcome the constraints and difficulties and to alleviate the hunger, poverty and unemployment that are suffered by man in many regions."

".....traditional forestry research is not making sufficient contribution to rural development, energy production and forest conservation."

"Governments, aid agencies and IUFRO should examine ways and means of generating additional funding needed for strengthening research related to forest resources in developing countries with primary emphasis on improving the capability of national institutions."

Although the specific concerns which these statements addressed may have changed in the intervening years, the principles espoused remain as relevant and, indeed, urgent today as in 1981.

In a definitive formulation, the mission of the SPDC for the future is stated as follows:

"The Special Programme for Developing Countries provides assistance to developing and economically disadvantaged country institutions and scientists for the purpose of strengthening the international community's forestry (including agroforestry) research capability and, in consequence, the community's ability to undertake sustainable forest sector development."

The programmes and activities of the SPDC will be guided by the following priority objectives.

- improvement of research quality
- improvement of research capacity/capability
- strengthening of national forest research institutes
- integration of programme with the IUFRO network

With respect to the last objective, a new direction for the SPDC, the purpose will be to undertake programme where possible in close collaboration with the IUFRO Research Group structure in order to take maximum advantage of the existing IUFRO network and to strengthen the relationship between the traditional IUFRO programme and the SPDC in

the delivery of programme. In elaborating this objective, due consideration must be given to the clear possibility of conflict between the desires of IUFRO to closely ally these two areas of responsibility with the needs and priorities of those to whom the programme is directed, i.e., the developing and economically disadvantaged countries, as well as with the uses to which donor funding may be put.

This period of consolidation and restructuring of the SPDC will, it is hoped, go a long way toward enhancing the image of the Programme within the international community. In fact, the evidence is already there as new, previously untapped, sources of funding have lent their support to the Programme. However, inevitably, this process has meant some short-term reduction in direct service to our clients, the developing countries and the emerging countries of the former East Bloc which are severely disadvantaged economically.

With the close of the transition period, the SPDC must swing back into a full programme of action. Funds are in place for programme continuation through 1993 and into 1994. Several realistic possibilities for additional funding are in place. But the SPDC will continue to need, and to seek, support from those who have been of assistance in the past.

Funding solicitation is a time-consuming but essential part of the SPDC programme. It is a classic "catch-22" situation. The more effort put into the obtaining of funds, essential for continuation, the less is available for implementation of programme. Much of the SPDC's programme in the future will be through contract, but on-site involvement is critical as well and in this regard there is an essential requirement for a technical officer to assist the SPDC Coordinator. Efforts are being and will be made to obtain support for this essential additional staff person.

It is insufficient and inappropriate for assistance agencies to establish programme without the input of those to be assisted. As one such agency, the programme priorities of the SPDC must reflect closely assistance needs as identified by developing and economically disadvantaged countries.

In-depth consideration of current needs and priorities was undertaken as part of the Bellagio and CGIAR deliberations preparatory to the establishment of CIFOR. Considerable input was obtained from developing country correspondents during that process. Other recent treatises have considered also these needs and priorities.

The SPDC has benefited greatly from these efforts in the preparation of its strategic plan. Additional learned reports and documents have been considered along with the views and comments obtained from developing country correspondents as well as from persons in the developed world who

through personal experiences are knowledgeable of conditions and needs within a range of developing countries in Asia, Latin America and Africa and within the emerging nations of eastern Europe.

The following needs and priorities form the primary direction for the furtherance of SPDC programme over the period (1993-1998) of the Strategic Plan. Other activities may be entered into as the result of emerging needs and changing global priorities:

- training and education
- information services
- inter-agency collaboration
- international interactions

Programme initiatives have yet to be elaborated but a number are in place for the period through 1993 as identified in the SPDC Work Plan, 1991-1993 and new programme initiatives are planned pending receipt of funds being addressed through current funding submissions.

The SPDC, as an organ of IUFRO, is a focus for the Union within the developing countries and with many organizations and agencies of the developed world. It contributes to the image of the Union and is an outlet for certain of the functions of the Union.

For much of the 1980's the SPDC stood virtually alone as an unaligned, general assistance programme for forest research in the developing countries. Over a period of several years toward the end of the decade and into the 1990s, international action was stepped up and new assistance mechanisms have come into being. IUFRO and the SPDC welcome these initiatives and, indeed, have been active in the deliberative stages. Several of these have been mentioned above but only the new CGIAR entities, ICRAF and CIFOR, have forestry-related research as *raison d'être*.

Even with these initiatives, the demand for assistance will not be fully served. Nor will these initiatives provide assistance in all areas requiring attention. Thus the continuance of the SPDC is important to the disadvantaged country community as well as to the international forest research community at large.

Given the limited global resource available for forest research assistance to the developing world, it behooves all involved to conduct the most effective, complementary programme possible. It is essential that meaningful dialogue take place on a regular basis amongst the various agencies involved and that development and implementation of programme be appropriately coordinated to avoid duplication and splinter efforts.

A principal player on the scene for the SPDC is CIFOR. IUFRO is well represented on the senior body of CIFOR which facilitates continuity of dialogue at the highest level. It also provides a natural avenue for the SPDC to enter into dialogue with CIFOR at the technical programme development and implementation level. Close collaboration must take place also with ICRAF and with other centres of the CGIAR who have strong interest in the implementation of forestry research programme.

The SPDC will seek to have appropriate representation on various organs of the forestry research assistance community and to integrate its programme with these same agencies. Periodic meetings and interaction between the SPDC and appropriate level officers will be pursued. The SPDC will seek to develop other interactions within the international community as are useful and appropriate and will seek to ensure that an appropriate image and understanding of the SPDC is developed.

The SPDC will enter into dialogue also with representatives of its constituency, the developing and economically disadvantaged countries of the world. A key feature of future programme must be that it seeks to better address the real needs and priorities of these countries. To achieve this, regular and determined contact and interaction must be fostered and entered into. The IUFRO network will play an important catalytic role in this regard.

INTERNATIONAL COLLABORATION IN FORESTRY RESEARCH

by

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Abstract

In 1991, the CGIAR (Consultative Group for International Agricultural Research) expanded its responsibilities to cover agroforestry and forestry, by deciding to fund ICRAF (International Centre for Research in Agroforestry) and to establish CIFOR (Center for International Forestry Research). Other CGIAR centres are also making significant contributions: e.g. IFPRI (International

Food Policy Research Institute) is reviewing its potential contribution in policy matters with regard to natural resource conservation and management, and IBPGR (International Board for Plant Genetic Resources) is preparing to be involved in conservation of forestry species germplasm.

The FAO-executed FORSPA (Forestry Research Support Programme for Asia-Pacific) has in the meantime been launched. This programme operates as a research network, and close collaboration between FORSPA and the CGIAR centres could help significantly to strengthen capacity of national research institutions in Asia. FORSPA has many attractive features which make it a good model for replicating elsewhere.

INTRODUCTION

This paper focuses on the role of the Consultative Group for International Agricultural Research (CGIAR) in supporting forestry research with special emphasis on collaboration between CGIAR Centres and regional/national research institutions and on the role that FAO is playing in helping to strengthen national research capability.

The CGIAR's recent decision to incorporate forestry and agroforestry research into its mandate represents the culmination of a series of international initiatives that have been taken over the last two decades to combat the negative impacts of deforestation. These initiatives aimed to mobilize increased awareness of the potential of agroforestry and forestry research to contribute to containment of tropical deforestation; to development of technologies for resource poor farmers; to increased agricultural productivity; to economic development and to protection of the environment.

A Bellagio Forestry Research Conference, held in November 1988, focused on identification of policy and technology interventions that could make a decisive impact on containing deforestation and improving agricultural productivity. For example, policy research on the impact of cattle ranching subsidies in Brazil provided the basis for significant changes in agricultural policies that will help to slow down the rate of deforestation.

Improved understanding of the complex interaction between trees, crops and livestock (which is a basic aim of agroforestry research) has contributed to development of improved agroforestry technologies, such as on-farm hedgerows of fast growing leguminous trees that contribute both to soil fertility, containment of soil erosion and to livestock fodder needs.

Raising the productivity of selected multipurpose fodder/fuelwood/fruit tree species (through provenance selection and in some cases through vegetative propagation) can help to improve on-farm fuelwood/fodder availability, to enhance farmers' income from cash crop tree farming and to accelerate current rates of reforestation. Recent research into mycorrhizal/tree growth interaction for regeneration of the Dipterocarp forests of South East Asia is contributing to increased productivity and sustained yield management of these valuable hardwood forests.

After reviewing future global forest research needs the Bellagio Task Force suggested five main areas as priorities for expanded investment in research; (1) agroforestry and watershed management; (2) natural forest ecology and management; (3) tree breeding and tree improvement; (4) utilization and marketing; and (5) policy and socioeconomic issues.

The report analyzed major weaknesses in existing research capacity and it recommended the establishment of an International Tropical Forestry Research Council, that could provide a mechanism for channelling and coordinating international, financial and technical support to forestry research. It recommended a significant increase in international funding of forest research with a preliminary target of US\$50 million by 1995.

At this Bellagio Forestry Research Conference, the donor community adopted many of the recommendations of the Task Force report (including in particular the proposed areas of priority). However, it declined to support the notion of an independent International Tropical Forestry Research Council. Instead it was agreed that ways and means should be explored of incorporating forestry into the CGIAR System.

At its mid-term meeting in Canberra in 1989, the CGIAR formally accepted in principle, the incorporation of both forestry and agroforestry research into its mandate. It requested the CGIAR's Technical Advisory Committee (TAC) to explore ways and means of achieving this.

TAC's review of priority research areas and institutional options

Throughout 1989 to 1991, TAC, in close consultation with FAO forestry experts interacted with forestry scientists and research institutions in both the developed and developing world in identifying areas of strategic forestry and agroforestry research in which the CGIAR system would have a comparative advantage. Many of these corresponded well with the findings of the Bellagio Task Force.

It also developed a series of alternative institutional options for incorporation of forestry and agroforestry research into the CGIAR system ranging from the creation of three discrete regional integrated

forestry/agroforestry research centres (located respectively in Asia, Africa, Latin America) to the concept of a single integrated global centre with outreach research activities in the various regions.

After considerable debate and the appointment of a special CGIAR Working Group to review these various options, it was agreed at the mid-term meeting of 1991 that the CGIAR should fund two major centres:

- **ICRAF:** The International Centre for Research in Agroforestry (which had existed since 1978, located in Nairobi, Kenya) with a specific mandate to act as the global focal point for agroforestry research.

- **CIFOR:** The Center for International Forestry Research, a new forestry research centre, which will be located in Asia with a global mandate for forestry research focused on conservation and improved productivity of forest ecosystems.

It was also recognized that some of the other existing CGIAR centres could make a significant contribution to either agroforestry or forestry research needs and recommended that steps should be taken to explore those options.

For example, IFPRI (The International Food Policy Research Institute, located in Washington, DC) has recently been reviewing its potential contribution to socioeconomic environmental policy research in the area of natural resource conservation and management. In mid-1991, it hosted a Forest Policy Workshop to help develop its own research agenda in that area.

Other CGIAR centres have also been actively reviewing the scope for their support to forestry research. For example, the International Board for Plant Genetic Resources (IBPGR) is currently preparing proposals for its involvement in conservation of biodiversity and forestry species germplasm. The International Service for National Agricultural Research (ISNAR) is actively exploring ways and means of extending its earlier work devoted to strengthening of national agricultural research systems to include strengthening of national forestry research institutions.

The emerging ecoregional centres, particularly the Centro Internacional de Agricultura Tropical (CIAT), the International Institute of Tropical Agriculture (IITA), the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and also the International Livestock Centre for Africa (ILCA), have all indicated their interest and willingness to

expand research in the agroforestry area. Several of these centres had already embarked on programmes for selection and improvement of leguminous tree fodder species for incorporation in tropical pastures and rangelands improvement programmes. IITA, ILCA and ICRISAT have, for a number of years, been testing alley cropping systems and shelterbelt crop interactions.

Complexity and location specificity of forestry research

Among the more difficult issues that the CGIAR system has had to grapple with in reviewing options for incorporation of forestry research into the CGIAR has been the complexity of forestry research. Both agroforestry and forestry research require a high degree of ecological site specificity to take into account local farmer and community perceptions of the both positive and negative influences of trees, on-farm productivity and human welfare and the site specificity of the very large range of trees species.

These factors imply the need for a more decentralized approach to research than has traditionally been the case for the CGIAR's commodity-oriented research programmes. They also call for a multidisciplinary approach to forestry research that incorporates socioeconomic, technological and ecological considerations.

Despite the fact that natural resource management and its components (e.g. sociology, agronomy, forestry, soils, water plant nutrition and agroecological characterization) are highly location specific, TAC in its review of evolving CGIAR strategies and priorities concluded that there are, and will remain, strategic issues and environmental problems which transcend specific local production systems and geographic/ecological regions.

These include, for example, basic understanding of soil water plant relationships, energy balances, sustainable input/output models, transnational issues of forest and water resource use, watershed land use management, migratory pests, soil erosion, forest ecosystem processes and impact of climate change on agriculture and forestry.

TAC characterized these issues in the broad research area of the "ecological foundation for sustainable production systems". It concluded that strategic research addressed to these issues could be of international relevance, that there are economies of scale in global approaches and that such strategic research can have substantial spillover benefits for both regional and national programmes.

Within that framework, the decisions taken by the CGIAR system on forestry recommended that about 30 percent of the CGIAR's allocations

to forestry and agroforestry research should be devoted to global strategic research issues at headquarters and 70 percent to support of research in the regions. It was emphasized that the latter would need to be conducted in the closest possible collaboration with national agroforestry and forestry research institutions. TAC's studies of that issue included an illustrative analysis of possible key research institutions, with whom the CGIAR Centres would need to interact.

Much of the CGIAR's recent forestry work has centred around designing strategic plans for both ICRAF and CIFOR and identification and selection of promising ongoing research being conducted by existing institutions with whom the CGIAR Centres could develop collaborative research programmes.

ICRAF's collaborative programmes with national research institutions

Although it can be practised in virtually all climatic zones by farmers living at various socioeconomic levels, agroforestry is a particularly useful tool in helping with three of the world's major concerns: rural poverty, natural resource conservation and sustainable development. Efforts to feed millions of people in marginal lands result in widespread deforestation of the humid tropics and massive land depletion in subhumid and semiarid areas.

A principal cause of deforestation is slash and burn agriculture, either spontaneous or after selective logging. Alternatives to slash and burn need to be found that will offer forest farmers technological options for more sustainable farming and ways to contain deforestation. Agroforestry farming systems are among the more attractive sustainable alternatives to shifting cultivation. They are also critical in the reclamation of secondary forest follows and in derived grasslands that often follow in the wake of short rotation shifting cultivation.

ICRAF now is spearheading a global "Alternatives to Slash and Burn" initiative in collaboration with leading national research institutions in Southeast Asia, Africa and Latin America.

At the farm level, on-farm tree planting and improved on-farm tree management can play a major role in helping to increase on-farm productivity, in contributing to increased farm income, to improved food security and to conservation of farm, soil and water resources.

Agroforestry is one of the more complicated biological challenges in the CGIAR system: how to grow annual crops with trees in a way that the inevitable competition for light, water and nutrients results in sustainable food production without degrading the environment. There is a limited fundamental understanding of how such interactions occur at the process

level and how they can best be manipulated by adapted germplasm and/or agronomic and silvicultural management techniques. Furthermore, agroforestry systems need time to get established and to exercise key functions such as nutrient cycling and soil conservation. Much of ICRAF's work at priority locations in humid, subhumid and semiarid ecosystems is aiming to develop a predictive understanding of the major interactive processes between people, trees, crops and/or animals that will be available to or of value to each ecosystem. ICRAF has given special emphasis to socioeconomic methodology for studying local peoples' perception of agroforestry systems. It has developed a strong agroforestry network system with national research institutions in Africa (AFRENA) and has plans to develop similar networking in Asia and Latin America.

In 1992, ICRAF had 47 senior staff stationed at headquarters and at AFRENAS in 12 African countries. It is in the process of recruiting additional staff for work in both Asia and Latin America and has recently advertised for 13 additional scientists of whom 10 will be outposted to work in national forestry or agricultural research stations in Indonesia, Brazil and Peru.

CIFOR's role and future research agenda

At the time of the mid-term 1991 meeting, the CGIAR appointed the Australian Council for International Agricultural Research (ACIAR) to undertake the task of establishing CIFOR. Since then considerable progress has been made in identifying potential board members, in drafting an establishment agreement and constitution for CIFOR, in locating a potential host country, in defining operating procedures and in contacting regional scientists and donors to sound out their perceptions of CIFOR's future role.

The task of developing a strategic plan for CIFOR and a detailed research agenda will be the responsibility of CIFOR's recently appointed Board and of its Director General, and CIFOR Research Staff whom it is anticipated will be appointed in 1993.

As a step toward helping CIFOR's Board and management to develop a research agenda, ACIAR interacted widely with many leading developing country national forestry research institutions in Latin America, Asia and Africa and with developed country research leaders and the donor community.

As a starting point ACIAR suggested that CIFOR might concentrate on the areas of high priority. In keeping with CGIAR goals special emphasis should be given to improved understanding of the role of forests in

contributing to human welfare, agricultural productivity and protection of the environment.

It suggested that research programmes be defined within a framework of four major forestry situations:

- Natural forests
- Open woodlands
- Plantations and woodlot
- Degraded lands

In a similar manner to ICRAF, it is proposed that CIFOR should operate with a decentralized research agenda interlinking with national research institutions in Asia, Africa and Latin America. Special emphasis will be given to collaboration with CGIAR ecoregional centres such as CIAT, IITA, ICRISAT and with other regional/national institutions. Its initial activities will focus strongly on identification of existing networks and research activities related to research topics of common interest and high priority in the various regions.

Initially, it is intended that CIFOR will maintain a small core scientific staff of some 10 to 15 scientists at its Asia region headquarters with multidisciplinary expertise covering not only forestry but also sociology, economic policy, ecological and other disciplines, with outreach scientists located in Africa and Latin America.

ACIAR's recent interaction with other research institutions and outreach scientists has suggested concentration of research on such areas as: socioeconomic policy and marketing research relevant to containment of tropical deforestation (e.g. land tenure, agricultural taxation and settlement policies, timber concession allocation procedures, timber taxation, industrial processing export and revenue collection policies); germplasm management of both natural forest and multipurpose tree species, improved understanding of microbiological processes in forest ecosystems (particularly mycorrhizal/nitrogen fixation, tree regeneration and growth relationships); selection, breeding of both tree and forest non-wood species (such as palms, fruits, etc.); nutrient, water soil relationships/stand dynamics/regeneration/and stand use of a wider range of species, management of water, nutrient cycles and development of management techniques; utilization and economic value of lesser known forest products and traditional non-market crops.

The task of reviewing these possible research thrusts and translating them into a Long-Term Strategic Plan for CIFOR is currently being

pursued by ACIAR and a sub-committee of CIFOR's Board which is interacting with leading regional and national institutions in Latin America, Africa and Asia and identifying promising ongoing research projects and research institutions with which CIFOR might collaborate.

Strengthening the capacity of national institutions through networking: the role of FAO

Because of the high degree of interdependence of CGIAR strategic work on forestry and adaptive research at the national level, much thought has been given to developing improved mechanisms for supporting effective networks with national forestry and agroforestry research institutions.

A recent FAO/ADB/UNDP initiative in the Asia region that has received endorsement of the FAO Regional Forestry Committee offers promise for replication elsewhere. This regionally funded and managed Forest Research Support Programme for Asia and the Pacific (FORSPA) is intended to provide a formal mechanism for linking up and sharing research interests of national forestry research organizations. In so doing it could become at the same time an effective network for research communication and consultation, with which the CGIAR and its centres could link up at relatively low cost compared to the effort of setting up one-to-one linkages with individual national forestry research organizations.

FORSPA will provide technical assistance support to national forestry research institutions in five high priority areas. The five selected themes for each of which FORSPA has developed a Strategic Framework, correspond quite well with the CGIAR's forestry research agenda.

The strategic work and long-term research plans of CIFOR, ICRAF and other CGIAR centres could provide a useful input to these FORSPA programmes and help to ensure sustained continuity of donor funds.

To illustrate this point, strategic research that has been carried out earlier by ACIAR scientists on the role of trees in reclamation of saline-sites in Australia is a possible area of strategic research that will be further pursued by CIFOR. This could make a useful input to a recent FORSPA project proposal for reclamation and improved productivity of saline soils in the State of Uttar Pradesh in India. That project will strengthen the work of the Division of Forest Soils and Land Reclamation at the Dehra Dun Forestry Research Institute. It could also benefit a similar project being funded by FORSPA at the Pakistan Forest Institute in Peshawar that is working on selection of suitable farm tree species for saline and waterlogged sites.

Two FORSPA projects located in Sri Lanka and Myanmar respectively,

which are concerned with development of farming systems and socioeconomic conditions to stabilize shifting cultivation could well benefit from ICRAF's strategic research on sustainable farming systems that can provide an alternative to "Slash and Burn" agriculture.

In the area of socioeconomic policy research a FORSPA project in Vietnam concerned with "Promoting Community Participation in Forestry Development" and another project in China that will study policy incentives for local people involvement in sustainable upland watershed management will be addressing at the national level, some of the same issues that IFPRI's 1991 Forest Policy Workshop identified as deserving of high priority in IFPRI's future forestry related policy research agenda.

To summarize, close collaboration between the CGIAR Centres carrying out forestry and agroforestry research and FORSPA could help significantly to strengthen capacity of national research institutions in Asia. Ways and means are currently being explored on how to strengthen similar collaborative linkages with national forestry and agroforestry institutions in other regions.

Mobilization of sustained donor support for funding collaborative programmes such as FORSPA would be facilitated if a mechanism could be devised for periodic presentation of regional complementary national institution strengthening programmes at the International Centre's Week meetings held in Washington, DC, at which donors annually review their pledges for support to research by the CGIAR Centres. This would likely be a more effective mechanism than the currently uncoordinated external aid agency support for forestry research that depends mainly on short term funding generated by ad hoc bilateral negotiation between national research institutions (or individual governments) and individual donors.

THE ROLE OF THE CENTER FOR INTERNATIONAL FORESTRY RESEARCH

by

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Abstract

The Center for International Agricultural Research (CIFOR) is currently being established according to a decision made in May 1991 by the Consultative Group on International Agricultural Research (CGIAR). A Board of Trustees has been formed, which held its inaugural meeting in July 1992. CIFOR will operate primarily in a decentralised manner, through partnerships and contractual arrangements with collaborating institutions in both developing and industrialised countries. CIFOR will be mindful of its strategic role i.e. research aimed at solutions to problems, and it will aim to stimulate and support national research efforts without creating a drain on them.

INTRODUCTION

Over the last 20 or more years, it has become increasingly apparent that a more concerted international effort is required if the problems of deforestation and forest degradation through inappropriate land use policies and management practices are to be resolved. While not all of the issues are responsive to enhanced research inputs, it has been recognised that greater investment in forestry research is essential if the knowledge base upon which sound forest management practice and attendant policy settings depend is to be raised to the necessary levels.

Traditionally, the International Union of Forestry Research Organizations (IUFRO) has acted as a medium for communication and cooperation among forestry research scientists operating from essentially national research institutions, mainly in the industrialised countries. However, other modalities are now required to complement national research programmes and to address regional and global issues, particularly in developing tropical and subtropical countries. This need was recognised

by IUFRO at its 1981 World Congress and resulted in the creation of the Special Programme for Developing Countries (SPDF). Other initiatives followed; the establishment of the Tropical Forestry Action Plan as a joint initiative of FAO, the World Bank, UNDP and the World Resources Institute in 1985, while not a research activity per se, raised the level of consideration of research needs within the context of the National Forestry Action Programmes flowing from the TFAP reviews of national forestry sectors. A key point was reached in 1987 with the first Bellagio meeting on tropical forests which led to the presentation of a Global Research Strategy for Tropical Forestry by an international task force. This strategy was considered in many fora including the second Bellagio donor group meeting which resolved to refer the matter of organisation of increased international donor support for forestry research in developing countries to the Consultative Group on International Agricultural Research (CGIAR). While this decision was looked askance throughout the forest research community, the CGIAR nevertheless accepted the task and entered into an intensive phase of planning its involvement, based essentially on the seminal document of the Bellagio task force.

The CGIAR was created in 1971 to undertake research on key agricultural commodities and over the ensuing years established several international centres to do this. Forestry was not part of the CGIAR mandate, but moves in the late 1980s towards a more land systems approach to research and to incorporate existing "non-associated centres" into the CGIAR, developed a climate whereby forestry research gained more ready acceptance by the system as a whole. The mission of the CGIAR was modified to accommodate this changed policy environment, and the development of forestry research within the CGIAR reflects this mandate:

"Through international research and related activities, and in partnership with national research systems, to contribute to sustainable improvements in the productivity of agriculture, forestry and fisheries in developing countries in ways which enhance nutrition and well-being, especially of low-income people".

After two years of discussion, the CGIAR agreed in May 1991 to accommodate forestry and agroforestry in the system. It has done this by establishing the Center for International Forestry Research (CIFOR) and by incorporating the International Council for Research in Agroforestry (ICRAF -now Centre). The aim is to ensure that CIFOR and ICRAF

collaborate on areas of common interest and develop complementary programmes where appropriate.

The United Nations Conference on Environment and Development (UNCED) has since evolved its "Agenda 21" which provides a framework whereby the CGIAR might further pursue its own land-system research agenda, for which the forest-based programmes of CIFOR will provide a highly appropriate medium for implementation.

CIFOR'S ESTABLISHMENT

CIFOR is currently being established and plans to initiate a programme of activities in 1993. The period since the May 1991 decision of the CGIAR to create CIFOR has seen essential governance issues addressed and the appointment of a Board of Trustees which held its inaugural meeting in July 1992. An outline of the Strategic Plan has been prepared and will undergo further revision and expansion once a Director-General is appointed. This document provides details of the approach being taken in developing the Centre, its programme structures and research priorities and is available from ACIAR for those wishing to obtain further information. In this working paper only salient matters will be highlighted.

CIFOR'S ROLE AND STRUCTURE

Mission:

"The purpose of CIFOR is to contribute to the sustained well-being of people in developing countries, particularly in the tropics, through strategic research and related activities in forest systems and forestry, and by promoting the transfer of resultant new, appropriate forest technologies for national development".

In pursuing this mission CIFOR intends to ensure that there is an emphasis on participatory development, sustainability and equity in parallel with the broader mission of the CGIAR. This strong orientation towards people will be reflected in programme activities emphasising policy and socio-economic issues conducted within a strategic framework; there will be less accent on conventional forestry research geared to the needs of the industrial forestry sector, for which the existing national institutions should provide the necessary support through their applied and adaptive research programmes.

Objectives:

CIFOR's objectives derive from the recognition that it is essential that an appropriate framework be erected upon which to undertake strategic, problem-oriented research at regional and global levels. The chosen framework is that of policy and socio-economic research which will provide the context for the more familiar biophysical research; in this way it is hoped that CIFOR's programmes will remain effective and relevant to the needs of users and the ultimate beneficiaries.

CIFOR's objectives are:

1. Understanding the biophysical and socio-economic environments of present and potential forest systems and forestry, and their functional relationship.
2. Creating the potential for sustainable improved productivity of forest systems for the benefit of people in developing countries.
3. Providing analysis, information and advice to assist in making policy decisions about forests and landuse.
4. Increasing national forestry research, research planning and management capacity.

Principles guiding programme development:

1. Providing a focal point within the CGIAR for leadership in forestry research world-wide by defining and updating a global approach with strong regional emphasis, e.g. ecoregionally located programmes with active national participation aimed at general results suitable for regional application.
2. Addressing these problems primarily by assessing the comparative advantage of existing (including non-traditional) institutions, and fostering and facilitating research by institutions on a selected basis by hands-on research on problems where CIFOR has a distinct comparative advantage.
3. Emphasizing commitment to strategic, process-oriented research adopting an ecosystem approach to forest systems, an holistic view in policy and socio-economic studies, and an integrated approach in management, silviculture and utilisation research.
4. Marshalling sufficient critical mass of scientific expertise and resources, operating in an interdisciplinary context, to ensure efficient and effective implementation of activities to meet clearly defined programme objectives.
5. Recognising that research must remain relevant to and serve the needs

of developing countries in their efforts to achieve sustainable landuse practices, should minimise further degradation of forest lands and must promote social equity.

Criteria for setting programme priorities:

1. Conformity with CGIAR goals, with special emphasis on impact upon rural poverty, income generation and linkages to increased agricultural productivity.
2. Concentrates on high priority ecoregions (humid, sub-humid and semi-arid) and forest resource systems of the tropics and subtropics including montane zones.
3. Involves strategic research of strong regional and/or global relevance and potential impact.
4. Has prospects of early visible benefit.
5. Relieves pressure on marginal and sensitive ecosystems and promotes/conserves biodiversity.
6. Develops strong linkages with ongoing national research activities and networks, and strengthens utilisation of existing research resources.
7. Encourages greater and more effective community participation in forest resource management.
8. Contributes to greater forest industrial efficiency.
9. Addresses issues of current global concern.

Programme Framework:

CIFOR's programme framework will adopt a matrix approach in which the following major components might be recognised:

Geographic region

- Latin America and Caribbean
- South and South East Asia
- Sub-Saharan Africa
- West Asia and North Africa

Ecological Zone

- Moist tropical forests
- Subhumid tropical forests
- Subhumid subtropical forests
- Semiarid tropical woodlands
- Semiarid subtropical Woodlands
- Montane forests and woodlands

Forest Resources System

- Natural closed forests

- Natural open woodlands

- Planted stands

- Degraded lands

Research approach

- Research for integrated land use and forest resource management

- Better forest policies and institutional frameworks

- Better biological bases for management of forests and forest lands

- Improved techniques for forest management

- More efficient utilisation of forest products

People Organisation

- Target groups

- Implementing groups and collaborators

- Interest groups

Scientific Discipline

- Single discipline

- Multi discipline

- Inter discipline

Within this multi-dimensioned matrix potential research projects can be identified and their priorities assessed against the criteria established above. In terms of specific fields of research, current planning favours attention being given to:

- upland watershed management and rehabilitation of degraded lands
- ecology and management of natural forests
- germplasm conservation and genetic resources
- non-wood forest products
- forest and landuse policy, socio-economics.

The research agenda will promote linkages among these programme areas and develop a thematic approach to cross-cutting issues such as biodiversity, community development, gender, environmental management and integrated landuse.

Modus Operandi:

CIFOR recognises that few of the significant problems of tropical forestry can be studied from a single location and the inadvisability of attempting to implement a globally-oriented programme from a single headquarters

location. CIFOR will therefore operate primarily in a highly decentralised manner from a series of regional nodes located in the major biogeographical regions with programme elements located within key ecoregions within these. Where possible and appropriate, these nodes will be co-located or be in close association with existing research institutions. These may be CGIAR centres or other international, regional or national institutions with strategic research capacity or potential. Initially one node will be established in each of the major regions i.e. Asia, Africa and Latin America. The node for Asia will co-locate with the headquarters until such time as a subsidiary node is warranted. In time it is possible to envisage a number of nodes in each region but expansion will depend on resources and the rate of programme development. As CIFOR staff in the nodes will be involved in collaborative research with local partners it is important that a critical mass of scientists be stationed at each node. Such teams must be inter-disciplinary in nature, the actual composition of each team depending on the programme elements being implemented at the particular node.

Hence CIFOR will operate primarily in a decentralised manner, through partnerships and contractual arrangements with collaborating institutions in both developing and industrialised countries. This approach will:

- be flexible, allowing for changing needs and funding
- be cost effective
- build on the strengths and comparative advantage of existing institutions
- permit the strengthening of research capacity in national research institutions.

The proposal is for CIFOR to allocate 70 percent of its resources to such nodally-based regional programmes and retain 30 percent at the centre. However the headquarters programme may also have out-posted components implemented by scientists stationed at nodes. Flexibility of approach is essential if an effective programme is to be developed which meets the particular needs of client groups.

STRENGTHENING OF NATIONAL RESEARCH SYSTEMS

An important component of CIFOR's programme will be the strengthening of National Forest Research Systems (NFRS). These are very weak in many developing countries, even where there is a well developed industrial forestry sector; the position is worse for community based forestry or

where forestry itself is institutionally weak.

CIFOR's approach may be threefold; through active participation of NFRS staff in CIFOR research projects, through the training of young NFRS scientists through both the project mode and through in-service activities (and even perhaps some formal post graduate training), and through the communication and information programme.

The general call for the CGIAR system to move upstream and be more involved in strategic rather than applied and adaptive research, created difficulties in developing effective programmes with NFRS's whose capacities for strategic research may be minimal. While there are exceptions, NFRS's are weaker in this regard than their agricultural counterparts. This makes the planning and execution of an effective programme which meets the expectations of developing countries and at the same time satisfies the strictures of the CGIAR, quite a challenge.

In this environment, technology transfer activities become at least as important as the research task itself. It also calls for a re-definition of strategic research to re-emphasise its "outcomes orientation" wherever it be pursued across the spectrum from basic through applied to adaptive research, with technology transfer operative at all steps involving linkages between scientist-scientist, scientist-extension worker and extension worker-forest manager/land holder.

Over the next few months, CIFOR will need to grapple with these issues in its strategic planning of the Centre and its programmes of research and information. The proposed information project Forest Research Networks Information System (FORNIS) will be a key resource in this planning as it will allow assessment of capabilities of NFRS's in both the developing and industrialised worlds and assist in the identification of research and information strategies CIFOR might adopt operationally for strengthening of developing country NFRSs.

COMMUNICATION AND INFORMATION SYSTEMS

It can be inferred from the previous discussion that communication and information systems will be keystone activities for CIFOR. These activities have been raised to formal programme level in the draft strategic plan. CIFOR recognises that well organised, comprehensive and up-to-date information is a vital requisite for planning and implementing effective forestry R & D programmes. The information programme will not only be an essential tool for the planning and implementation of CIFOR's own research activities, but will also serve as a major medium for assisting

NFRSs and hence increasing their effectiveness as research institutions.

Staff in this programme will work closely with scientists in the research programmes to ensure that every project includes appropriate training, technology transfer and communication elements. The extent to which this can be done as a collaborative exercise with other organisations, e.g. International Service for National Agricultural Research (ISNAR), FAO, IUFRO-SPDC, ICRAF and CAB International (CABI) is yet to be pursued, but CIFOR is keen to undertake such complementary activities and will be seeking to establish a viable and accessible information network among various interested parties.

A start in this direction has already been made with projects on tree germplasm data base development (jointly with the International Board for Plant Genetic Resources - IBPGR); planning of an information system on tree growth potential and environmental conditions - TROPIS (ACIAR in conjunction with the Australian Bureau of Rural Resources); and consideration of an information system on forest research networks (FORNIS) by CIFOR in concert with FAO and IUFRO, possibly utilising an information system (AGREP) developed by the Commission of the European Economic Community for European agriculture.

This information programme with components of communications, information systems, technology transfer and training is seen as a focal point of CIFOR's contribution to the strengthening of the national research systems.

CONCLUSION

The expectations of the CGIAR and the wider forest research community are for CIFOR to become the focal point of a greatly increased international effort in forestry research aimed at the needs of the tropical and subtropical forests and woodlands of the developing world. This can only be achieved if there is an adequate resource base and there is a positive spirit of cooperation developed among the many interest groups with a stake in the fate of the world's forests - which ultimately means the people of the world. In serving their best interests (and who can define best?) CIFOR will be mindful of its strategic role (i.e. research aimed at solutions to problems) rather than the self-serving of research which perhaps unwittingly has contributed to the ineffective nature of much tropical forest research in the past.

Resources are critical, both of manpower and funding. The collaborative nature of CIFOR's mode of operation will require the

commitment of manpower resources by partners, but given the modest size of CIFOR's programme, at least initially, this should not create distortions or bleed off scarce national resources. In many instances, scientists in developing countries have basic training, but lack research skills and resources to undertake effective research i.e. they are under-employed, become discouraged and mobilise out of research. By providing resources in terms of research opportunity, access to funds and equipment, training in research skills and exposure to other more advanced research activities, CIFOR can stimulate the national research efforts without creating a drain on them.

FORESTRY RESEARCH AND FAO

by

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FAO

Abstract

FAO is the world's leading international agency for the collection and analysis of information on all aspects of forestry. Through its field programmes, it is also the principal source of assistance in forestry to developing countries. In support of research, it is actively involved in the development of research networks, the production of directories on forestry research and education, and the preparation of books and manuals.

INTRODUCTION

FAO was founded in 1945 as the principal United Nations organization concerned with world food supplies and agriculture, including fisheries and forestry.

FAO is today the world's leading international agency for the collection and analysis of information on all aspects of forestry and forest industry. This information is disseminated to governments, institutions and individuals throughout the world through publications, meetings and training courses.

Advisory groups consisting of experts in forestry development, research, education and industry give FAO access to the latest advances in knowledge relevant to its work. In addition, various statutory bodies such as the Committee on Forestry, the Committee on Forest Development in the Tropics, "Silva Mediterranea", the Advisory Committee on Forestry Education (ACFE), and the various FAO Regional Forestry Commissions provide opportunities for world leaders in forestry to meet regularly to discuss current issues and advise on FAO priorities and programmes.

FAO has been entrusted with the coordination of the Tropical Forestry Action Programme (TFAP), a cooperative effort initiated by FAO and others in 1985 as a vehicle for harmonizing international assistance in tropical forest conservation and development and for generating increased financial support to forestry programmes at both the international and national level.

Through its field programme, FAO is the principal source of technical assistance in forestry to the developing countries.

GLOBAL AND REGIONAL DATA COLLECTION, ANALYSIS, REVIEW, TECHNICAL SUPPORT AND INFORMATION DISSEMINATION

FAO does not do "hands-on" laboratory or field research. However, its activities in data collection, analysis, review, technical support and information dissemination in forestry at the global and regional levels are closely linked to research. Brief summaries of these activities are as follows:

- i) **Assessment and monitoring of forest resources:** preparation of the 1990 Forest Resources Assessment of developing countries; dissemination to developing countries of the FAO generalized forest inventory data processing software and the Area Production Model software; pilot study on the use of meteorological satellite imagery in assessment and monitoring of tropical forest resources
- ii) **Sustainable management of forests:** reviews of tropical high forest management systems in the three main tropical regions (Asia, Africa and America)
- iii) **Tree improvement and forest genetic resources:** in situ conservation of plant genetic resources; support and coordination of global and regional networks on forest tree seed collection, distribution and

- exchange, and evaluation of forest genetic material in international provenance trials; coordination of forest genetic resource development and conservation activities in the Sudano-Sahelian zone. Publication of annual newsletter "Forest Genetic Resources Information" in three languages
- iv) **Forest plantations:** review of pure and mixed-species plantation management; documentation of species x site interactions; plantation establishment and management
 - v) **Forest protection:** organization of regional pest control, disease control and fire control activities
 - vi) **Watershed management, forest hydrology, upland conservation:** creation of and support to networking activities in watershed management in Latin America, the Asia-Pacific Region, the SADC countries, and Europe
 - vii) **Wildlife and protected area management:** study on the role of wildlife for food; manuals on national parks planning and the management of crocodiles in captivity; development of national projects for wildlife management, ranching and farming
 - viii) **Arid zone forestry:** establishment of, and support to, networks on wind erosion control, sand dune stabilization, and Mediterranean forestry
 - ix) **Shifting cultivation and agroforestry:** support to the networks on agroforestry
 - x) **Geographic Information System (GIS):** participating in the development and management of an FAO GIS and the establishment of an integrated database for global and regional analyses and support to member countries in GIS applications
 - xi) **Pulp and paper industries:** collecting and disseminating information; monitoring the development of world production capacity and carrying out special studies on other technical and economic aspects of pulp and paper industries

- xii) **Sawmills and wood-based panel industries:** carrying out technical and economic analyses with special emphasis on the appropriate size and technology adapted to local markets and, where possible, to export prospects
- xiii) **Wood products industries:** collecting and disseminating information; monitoring the development of world production capacity and carrying out special studies on the technical and economic aspects
- xiv) **Forest harvesting and road construction equipment and systems:** collecting, analyzing, and disseminating information, including productivity and economic appraisals
- xv) **Tropical timber trade and markets:** collection and analysis of international information in order to assist tropical countries in increasing their share in world timber trade
- xvi) **Forestry policies:** analysis of major issues and opportunities influencing the development of forestry policies and of their interactions with the policies of other sectors, identification of policy options and responses at national and regional levels, assessment of forestry policies impacts
- xvii) **Forestry institutions:** identification of institutional arrangements which bring efficient cooperation among interest groups and involve local people in tree growing, management and rational utilization; analysis of collective arrangements and conflict resolution processes for common forest property resource management. Development of participatory approaches
- xviii) **Socio-economic role of trees and forests for rural people:** analysis of the role of forests and trees and related activities in food security and nutritional status of local groups, in income generation. Identification of the dependence of power groups on forests and trees, analysis of gender role in forestry activities.
- xix) **Forest research, education and training** (see below).

To carry out the above activities, FAO maintains a core group of qualified and experienced experts in three technical divisions of its Forestry

Department, viz. the Forest Resources Division, the Forest Products Division, and the Forestry Policy and Planning Division. The expertise of the core group is supplemented from time to time by the hiring of consultants for specific tasks, usually in the form of authors' contracts. The Department is supported by a well-stocked forestry library, with 3,000 books\monographs, 570 current serial titles with back issues and a large collection of grey literature, country files and meeting papers occupying 206 linear metres of shelves.

Most of the technical reports of the Forestry Department are published in the FAO Forestry Paper series, of which there are now over 100 numbers, and the Forest Conservation Guide series (22 numbers). The Department also publishes the quarterly forestry journal UNASYLVA.

FORE (FOREST RESEARCH, EDUCATION AND TRAINING BRANCH)

In 1990, FORE was established specifically to be FAO's focal point for matters pertaining to forestry research, education and training. FORE's main responsibilities are:

1. Produce and update world directories of forestry research and educational/training organizations. A draft directory of forestry research organizations has been completed in 1992, covering 550 organizations. The compilation of the directory on educational/ training organizations has begun, and a directory of forestry research networks is being planned.
2. Produce manuals on forestry research, especially to assist developing countries. In 1992, FORE produced "Research Management in Forestry". Publications are planned on financing of research, scientific publishing and other matters of interest to research managers and scientists.
3. Act as FAO's liaison with the SPDC (Special Programme for Developing Countries) of IUFRO (International Union of Forestry Research Organizations) and CIFOR (Center for International Forestry Research), the latest research centre to be set up by CGIAR.
4. Organize meetings of the Advisory Committee on Forestry Education (ACFE) and the Expert Meetings on Forestry Research. These meetings take place in alternate years.

THE FAO FORESTRY FIELD PROGRAMME

FAO's Forestry Field Programme, coordinated by the Forestry Operations Service and backstopped by the technical divisions, covers about 300 projects worldwide. In the 1991 Project Catalogue, the numbers of projects are given as follows:

<u>Global and inter-regional projects:</u>	7
<u>Regional Projects</u>	
Africa	11
Asia & Pacific	10
Latin America	6
Near East	2
<u>Country Projects</u>	236
TOTAL	272

Several of these projects are wholly aimed at the strengthening of forestry research in developing countries. These are:

1. FORSPA (Forestry Research Support Programme for Asia-Pacific Region). 3 years.
2. Strengthening Bangladesh Forest Research. 1½ years.
3. Assistance to research for afforestation and conservation (Ethiopia). 3 years 8 months.
4. Assistance to Indian Council of Forest Research and Education. 5 years.
5. Support for research and development at FRIM (Malaysia). 5 years.
6. Bamboo research and development (Philippines). 5 years.

Projects which have a significant research component are as follows:

1. Agroforestry systems research and development (Asia and Pacific). 2 years.
2. Integrated resource development of Sunderbans reserved forest (Bangladesh). 3 years.
3. High-yield poplar plantations in warm temperate and semi-arid East China. 6 years.
4. Walnut improvement, research and plantation programme development (Iran). 2 years.
5. Watershed management research/education at Pakistan Forestry

Institute. 3½ years.

6. Improved productivity of man-made forests through application of technological advances in tree breeding and propagation (Asia-Pacific). 5 years.
7. Improvement of genetic resources. Multi-purpose trees (Africa). 3 years.

GUIDELINES FOR THE ESTABLISHMENT AND SUPPORT OF TECHNICAL COOPERATION NETWORKS

by

Evaluation Service

Food and Agriculture Organization of the United Nations

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INTRODUCTION

Technical Cooperation Networks have become an increasingly important means of action for FAO and are initiated and supported through the Headquarters and Regional office Regular Programmes and through the Field Programme. In 1990 the Organization facilitated TCDC through the support of some 135 networks in agriculture, fisheries, forestry and rural development. During 1990/91 the Evaluation Service undertook a study of FAO experience with networks². The study showed that networks can reduce duplicative effort among national institutions in several countries. They may also provide a cost-effective instrument for information exchange and institution building (including training). Several networks were found to have been making progress also in collaboration for technology development and studies. However, establishing self-reliant joint inter-country programmes among network members has proved more difficult. Many existing networks were found to have had no existence independent of FAO.

²

The detailed results of the study are reported in Chapter Eleven of the FAO Review of the Regular Programme 1990-91. Copies can be obtained directly from the Evaluation Service FAO (Rome).

Networks covered in these Guidelines comply with the following definition. A technical cooperation network is a voluntary cooperative arrangement among institutions in two or more countries, set up for a period of at least several years, to carry out jointly certain specified activities (information exchange, research, training, exchange of personnel, etc.) for the purpose of direct exchange of relevant technologies, experience and information to address a common development problem. A network must include the concept of membership which makes a tangible contribution to its programme of activities. A mailing list, a newsletter, a regional project or a series of meetings for which FAO pays do not constitute a network, although they may contribute to one. An essential characteristic, which distinguishes networks from regional projects, is that they set out to maximize the use of indigenous expertise and resources available among the countries themselves and thus rely less on external inputs. Essential features of a network include:

- concentration on specific development issues/problem(s) of common concern to a number of countries;
- a clear structure for cooperation (which may be formal or informal) with a joint work programme;
- defined membership with an evident interest in the work of the network.

In terms of their organizational set-up, FAO-supported networks generally fall into one of the following three main types:

- a) associations with a formal structure, such as those for agricultural credit and marketing, with a constitution or similar agreement and a management committee of some kind. Members pay contributions and their work programmes often include publications, newsletters, meetings for exchange of information, studies and a range of training activities;
- b) less formal arrangements often designed to facilitate the development of technical approaches and exchange of information through joint activities of a continuing nature, such as technology development and adaptive research trials. In this type of network, members agree a work programme, make inputs in kind and may cover part of their own costs, but there are no formal membership dues; and
- c) arrangements like those defined in (b) above, but set up for a

limited duration to undertake specific activities of more limited scope such as a joint research project e.g. the networks promoted by the Joint FAO/IAEA Division.

WHY HAVE A NETWORK?

Most, if not all, agricultural and rural development problems transcend national boundaries and networks have proven to be an effective institutional framework for inter-country collaboration, especially among developing countries. Networks have been promoted with two primary functions in mind: firstly to bring about the more effective use and sharing of appropriate and easily transferable technical information, skills, resources and experience between countries; and secondly to act as a cost-effective two-way channel with FAO for communication of information and promotion of strategies. The potential advantages of networks for the developing countries include that they may:

- facilitate exchange of information, allowing countries to draw on each other's experience and to avoid repetition of work;
- allow joint programmes to be developed, economising on scarce resources, particularly of trained manpower and sometimes allowing larger programmes to be undertaken than could be the case by one country alone;
- develop common technical standards, methodologies and approaches for such diverse areas as laboratory procedures, agricultural exports and environmental risk assessment, facilitating the common use of information, and in some cases, trade;
- sometimes bring together developed and developing countries, allowing additional technical resources to be mobilised in support of developing country problems;
- provide a flexible, continuing and direct inter-face for external assistance on common problems, without the cumbersome internal administrative processes associated with the traditional type of project;
- eventually lead to the formation of continuing arrangements for joint activities in such areas as research and training, technical cooperation on problems which cross national boundaries (e.g. food security surveillance) and economic cooperation (e.g. in the management of a common resource such as shared fish stocks).

The commonest activities carried out by networks are:

- issue of newsletters and other publications which inform members of developments in each other's countries and elsewhere;
- conduct of seminars and meetings at which members exchange views and information;
- coordinated or joint programmes of research and studies;
- joint training and study tours.

Networks may also:

- exchange experts as consultants on various problems;
- disseminate up to date intelligence on such matters as markets and food and pest early warning;
- exchange genetic resources including germplasm;
- maintain international data bases;
- provide a framework for international referral and reference, including reference laboratories.

Among these activities, networks have shown themselves best able to carry out information dissemination activities. The independent execution of joint programmes has proved more difficult, and for this networks have tended to rely heavily on external funding and guidance. For example in research, national activities may be modified as a consequence of knowing what is going on elsewhere and may begin to contribute more towards a broader goal, but active participation in an international programme is likely to occur only if this is contracted through the network with external support. Training using each others' facilities and the development of joint training activities have experienced similar limitations. The exchange of consultants for specific assignments among network members has not generally been greatly in demand and institutions are reluctant to release key staff except when they are reimbursed in full.

STEPS IN INITIATING A NETWORK

Initial problem identification: Before a network is begun the sponsors, such as FAO, should be fully aware of a development problem or set of problems which they wish to address. These must represent a felt need of several countries which also have some resources of their own committed to work in the area. The chances for success will be higher if this set of

Lesson 1: Networks are not a suitable vehicle for promoting a field of work in which the participants themselves have very limited technical personnel capability. This requires more substantial assistance at the national or regional level than is possible under technical cooperation networks. However, networks can serve to draw attention to relatively neglected problems. When the primary objective is the execution of a predetermined programme of work, this should not be expected to result automatically in an enduring network. For this the members must evolve their own programme. By their very definition networks are participatory institutions relying on voluntary inputs from members. They are thus not a suitable mechanism for the achievement of rapid results, nor can the same technical standards be expected as in a programme totally under FAO's supervision.

problems is neither so limited as to restrict interest to a very narrow body of expertise or so wide as to loose coherence. In-depth assessment of needs before a network is formed can be helpful, but in defining the areas of technical concentration and network orientation, it has often been found effective to apply an incremental approach. Thus it is first ascertained that potential members share genuine interest in a certain topic and then the network is encouraged to evolve gradually as the members determine those specific common concerns on which they can best work together. Sponsors must have immediate and longer-term objectives clear, but these will probably be modified over time.

Identification of potential participants: The next step is an assessment of national institutions that work actively on the topic and that are interested in participating in the network. Information on the technical and institutional capacity as well as financial resources of possible members is essential in assessing their potential contribution to the network programme and the extent to which external resources will be necessary. Among the participants there should be several relatively strong institutions that can exercise a leadership role in carrying out the network tasks. If there are few strong institutions within the region, involvement of developed country institutions could help bring in needed expertise and sometimes generate additional finance.

Confirmation of the role of other institutions and networks in the region: There have been a surprising number of cases of competing and overlapping networks addressing the same or very similar topics. It is essential to check what other inter-country activities in the region relate to the potential topic of network concern. In general, it will be more effective to link or integrate the proposed network with an existing network supported by another institution such as an International Agricultural Research Centre, rather than starting something entirely new. In particular, this will enable national institutions to maximize their contribution to one network, rather than dissipating their efforts in two or more.

Consider potential funding and institutional arrangements, as well as the preliminary work-plan: Institutional and funding arrangements together with a realistic initial work-plan are a major element in network success. They are thus discussed in detail below. Before initiating a network it will be essential to give in depth consideration to these.

Lesson 2: Before starting a network it is essential to be clear as to its purposes (i.e. what it will achieve); how it will be funded and how technical inputs and the secretariat will initially be organised

Preparatory meeting(s): Normally the final step in network initiation is the holding of a meeting or series of meetings for potential members. Very often national representatives will not be in a position to make definitive decisions after just one meeting. Such meetings should be well prepared: i.e. the secretariat will have specific proposals to offer to participants on network development. At the same time the meetings should clarify the real interests of the potential members as well as how and in which areas they will be able to contribute to the network. The meetings should not be concerned just with organizational issues, but should provide a foretaste of the benefits of networking. Members should be given adequate time to present and discuss their national programmes including areas in which they are in a position to participate meaningfully. One or two topics may also be singled out to ensure well prepared, detailed presentation and discussion. At the completion of the preparatory meetings there should be a clear idea of network objectives and work programme as well as agreement on the institutional and organizational arrangements for the network, funding and an initial work-plan.

Lesson 3: Before initiating a network remember that:

this is a long term endeavour requiring continuing support. There are as yet no examples of networks initiated by FAO which have become entirely self financing;

work carried out on behalf of the network by members is likely to be in addition to their normal duties and they will quite possibly require some direct incentive for this.

CRITICAL FACTORS FOR EFFECTIVE NETWORKING

Most of the factors which influence the success of any project or programme apply equally to a technical cooperation network, for example clear objectives and adequate planning. Below an attempt has been made to single out those points more specific to networks.

Choice of Subject Matter and the Work-Plan: It is evident that networks will be successful only if members share a felt need for work on the subject matter. Experience has shown that, members' priorities are likely to evolve rather than being immediately evident. An exception to this is networks set up on a temporary basis to address a specific research problem, using external funding. Care must be taken to ensure that the network programme does not become donor-driven. Work programmes should thus develop in a flexible way. In general networks should seek to build on and tie together the existing activities of their members rather than starting completely new programmes. Networks have a tendency to agree on vague and ambitious lists of topics to be covered. It is important to have precise and realistic **workplans** which assign responsibilities to members and to the secretariat for each aspect of an activity. Where members are provided with network funds to carry out particular activities, the presentation of proper work plans and reports on the activities carried out should be a condition of funding.

Membership, Geographical Coverage and Size: There are advantages in starting small and growing gradually so as to ensure that all the members have genuine interest, can get to know each other's institutions and share problems. Although it is an attractive proposition to bring

Lesson 4: At the start of a network there needs to be a critical mass of activities sufficient to ensure member interest, but it is better to let activities build-up gradually than start with a programme which cannot be sustained.

together countries with different international languages, this often entails considerable use of translation beyond the resource capacity of the members. This is a particular problem between Anglophone and Francophone African countries and between Latin American and Caribbean countries. As a general rule separate networks or sub-networks should be set up for the two communities.

Except in the case of very large countries where there would be too many individual national members, there are advantages in encouraging all the relevant institutions in a country to be members. Reliance entirely on one national focal point can become overly-bureaucratic and in extreme cases communication can become blocked by an inactive focal point.

Many networks include developed countries, either as full or associate members, and experience with such arrangements is generally positive. The developed countries' expertise and sometimes financial resources are mobilised in partnership and their technical outputs become immediately available to a group of countries.

Lesson 5: It is better to start with a small, cohesive and enthusiastic membership than to try and involve all potential members in a region.

Organizational Structure: As noted in the INTRODUCTION above, networks range in their level of institutionalization from highly structured associations with precise conditions of membership, elected committees, etc. to loose arrangements with no formalized structure. If networks are intended to develop commercial services and have a system of membership dues to support certain activities, they will eventually need a clear constitution and legal status. This has not been generally the first step, however, and in their early years networks should have maximum flexibility for organizational arrangements to develop in line with the work

programme and types of activity undertaken. Also, when networks have formal structures, there is an ever present danger that they may become absorbed in organizational and administrative issues, rather than the substantive business for which they have come together. Separate governing bodies and committees are not essential to networks, although it is necessary for the members to meet regularly and decide their own programme. In the longer-term, however, if networks are to sustain themselves with a greater degree of self-reliance, there will be a need to formalise arrangements for managing and coordinating their activities.

Lesson 6: Flexibility of network organizational structure is desirable, especially in the early years but this should not be confused with uncertainty as to which functions are to be carried out and who will perform them.

Sub-networks and Working Groups: Formal or in-formal sub-networks and working groups are a valuable mechanism for organizing joint activities and concentrating on particular topics. Similarly, in the interest of economy separate networks or sub-networks could be formed to cover countries separated from each other by very large distances, such as the Pacific and South Asia. The advantage of sub-networks, rather than completely separate networks, is that they allow some relevant experiences to be shared in an orderly manner and it may be possible to utilise a common secretariat. Nevertheless, it is desirable to start with one sub-network at a time, rather than launching a large network with many simultaneously formed sub-networks. Sub-networks and working groups may also be temporary, forming and dissolving as particular activities are completed.

Network Coordination and Secretariat: The coordinator is the bridge which links together all members and activities. It is desirable for this function to be carried out by the members themselves or their paid employees. This can help to ensure member involvement, even at the risk of some loss of effectiveness. However, this function is so critical that it may, for many years, have to be carried out by or heavily backstopped from FAO. Different functions can be assumed by different individuals. Selection of individuals within institutions rather than institutions per se helps to ensure true interest. Coordinators must be able to: devote adequate time and energy to the network; provide leadership; and have facilities at their disposal for communication etc. Selection of coordinators on political or

seniority grounds without regard to competence can significantly reduce the effectiveness of a network.

Lesson 7: The secretary and coordinators for a network are an absolute key to its success. They should be selected on their personal capacities and at the start of a network it may be essential for FAO staff to assume these functions.

The institutional location of the secretariat is a very important consideration. If there is a full-time secretary, placement within an FAO regional office can have considerable advantages for communications and may reduce the difficulties associated with giving the network and its employees formal legal status. Similarly their location in FAO regional and country offices can facilitate the financial operations of networks. It has also been observed that communication with members through the FAO regional office can give the network a certain status in the eyes of its members. It may also however reduce the extent to which they genuinely perceive it to be their network.

National Focal Points: Sometimes there is not only inadequate interchange of information at international level, but this also applies within countries. National focal points are particularly useful when it is intended to develop in country networks of institutions which then link to an international network. However, national focal points may act as bureaucratic bottlenecks, especially if assigned to someone located in a central department with little direct interest in the network's activity. Routing all correspondence from and to the network through an uninterested focal point introduces delays in communication with consequent negative effects on the work programme and sense of involvement among national institutions. **The secretariat of the network should generally communicate directly with its members.**

Financing: When networks are being initiated, the sponsors generally expect that activities will gradually become self-supporting. As already noted, this has not proved realistic, and complete self-reliance has not as yet proved possible. Networks can, however, gradually assume more of their own costs and by the success of their programmes generate funds from elsewhere. Networks consisting of business or commercial type

organizations generally find it easier to raise revenue from their members than governmental organizations concerned with service activities such as research, training and extension.

Lesson 8: Long-term external support is essential for network development, but excessive inputs of money or personnel by sponsors will work against the development of self reliance and a genuine network spirit.

Member inputs: Promoters of networks should insist from an early stage on some tangible input from the members. This facilitates not only developing orderly implementation of the work of the network, but also the growth of member commitment. Member inputs will frequently be in kind, including staff time, the provision of physical facilities, hospitality etc. For example, some networks carrying out joint training employ a formula whereby the trainee's employer covers international travel and salary, while the host country covers local costs. Many network members have no access to foreign exchange to cover expenses for activities conducted in other member countries. Members may thus pay dues, subscriptions, training fees etc. into a local account which is used by the network for their in-country expenses. It is desirable to increase self-reliance also when the network is supported with donor grants.

FAO and donor inputs: External inputs and technical backstopping are essential to all networks and at the initial stage they must support a level of activity which promotes member interest and allows members and promoters alike to see which aspects of the potential network activities are genuinely of interest and workable. Excessive levels of support can however break the network. Projects with substantial resources may dominate the network and sap its self reliance. Regional projects with their own staff can develop their own momentum reducing the commitment and sense of identity of network members. Network establishment is a long-term endeavour and it may be better to ask a donor to spread the same amount of project funds over an extended period.

Networks frequently represent a major channel for FAO technical support to countries. The Organization thus often has a legitimate long term interest in the maintenance of network viability and technical

standards.

Lesson 9: Promotion of a network by FAO represents a long-term commitment of manpower and financial resources by the Organization. The work of the network must thus represent a continuing priority for FAO.

The way in which external inputs are provided must thus stimulate, rather than detract from, the development of a programme by the members. Ideally, external financing can underwrite a minimum level of management and coordination for the network and provide additional funds for mutually agreed aspects of the network work-programme, such as training or publications. In general members should be expected to cover a substantial portion of local costs while the sponsors meet foreign exchange needs. Network members should not be allowed to develop a sense that the network is an FAO activity, and such allowances as per-diem etc. should not normally be given at international rates.

Some Key Points

Networks provide a valuable way of extending the cost effectiveness of FAO's programme and represent a long term commitment by the Organization. They must thus be fully in line with continuing Organizational priorities. The immediate purposes of the network and the way in which it is likely to develop must be clear from the outset. There needs to be a careful identification of members and assessment of their genuine interests. The way in which the organizational structure of the network is likely to develop needs to be defined, but should be flexible. The keys to successful networks include member interest in the topic, a clear and realistic work programme, an organizational structure which promotes ease of communication, strong leadership, and adequate but limited external support so that members are also called upon to make a commitment. Networks must be allowed to evolve both in terms of work programme and organizational structure with the membership increasingly defining its own priorities.

Useful References

FAO - Review of the Regular Programme 1990-91 Chapter Eleven, Technical Cooperation Networks

Faris - Agricultural Research Networks as Development Tools - Views of a network coordinator, IDRC-Canada and ICRISAT 1991

Plucknett, Smith and Ozgediz - Networking in International Agricultural Research, Cornell University Press 1990

**ANNEX - CHECKLIST OF POINTS TO BE CONSIDERED
IN ESTABLISHING A NETWORK**

1.	Is the purpose of the network clear? Specify the purpose for the short and long-term?	yes	no
2.	Are the network purposes a continuing priority for FAO?	yes	no
3.	Has any alternative solution to networking been considered as a way of tackling these problems? - why was a network thought to be the best solution?	yes	no
4.	Is the network expected to be of interest to: - central government departments - individual governmental institutions - commercial and business organizations - non-governmental organizations	yes	no
5.	Have potential participants been identified? List the potential participants together with the particular contributions they can be expected to make to the network in terms of expertise, finance and inputs in kind.	yes	no
6.	Has the interest of potential participants been assessed? How has this assessment been made?	yes	no

7.	Are there major barriers to working together in the region of: <ul style="list-style-type: none"> - geography - politics - language - level of development? Could these be overcome using: <ul style="list-style-type: none"> - sub-networks - reduced country coverage at the start? 	yes	no
8.	Are there other networks or regional institutions with overlapping mandates to the proposed network?	yes	no
	- if other networks exist could their mandate be expanded, rather than starting a new network. If not why not?	yes	no
9.	Are funding assumptions realistic? Is funding for the network assured? Is funding based on a continuing commitment by FAO or donors?	yes	no
10.	Will the network function in more than one language?	yes	no
	- if so are there funds to cover this or should separate sub-networks be set-up?		
11.	What are the main activities envisaged for the network?		
	- newsletter	yes	no
	- state of the art publications	yes	no
	- research/studies	yes	no
	- immediate information (markets, food early warning etc.)	yes	no
	- data-base	yes	no
	- seminars	yes	no
	- training courses	yes	no
	- study tours	yes	no
	- exchange of experts	yes	no
	How will each of these be organized and funded?		
12.	Is there a work programme for the network?	yes	no
	- is it realistic		
	- does it specify who will do what		
	- does it define where resources are to come from for each activity?		

13.	Is the network to have a formal constitution and structure?	yes	no
	<ul style="list-style-type: none"> what are the advantages and disadvantages of formalization? What arrangements have been made to ensure that the network programme is genuinely agreed by the members? 		
14.	What are the lines of communication between: <ul style="list-style-type: none"> members members and the secretariat? 		
15.	Is the network to have: <ul style="list-style-type: none"> national focal points subject matter or sub-regional coordinators? What are the advantages and disadvantages of this?	yes	no
16.	Who will be secretary/coordinator(s) for the network? <ul style="list-style-type: none"> Do they have the time, motivation and resources for the job? 	yes	no
17.	How will the network be funded: <ul style="list-style-type: none"> members' dues (do they have access to funds and foreign exchange?) in-kind contributions by members subscriptions for services donor support (is this available on a long term basis) FAO Regular Programme support (is this available on a long term basis)? 	yes	no
18.	Would it be useful to obtain technical support by associating developed country institutions or other international organizations with the network and if so which?	yes	no

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S	-	Spanish			

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