

OPPORTUNITIES IN THE THIRD MILLENNIUM

Having seemingly floundered for decades, it seems as though African aquaculture is finally on sound footing; ready, willing and able to advance and be counted among the important food producing enterprises in many African countries. This genesis is attributable to several factors. Learning from the previously cited lessons was a corner stone that positively applied years of experience to new endeavours. There were also other major contributors.

This Century has witnessed a renewed political will to develop the aquaculture. In part, this has been a political necessity as increases from country's capture fisheries needed to keep pace with growing populations became increasingly difficult to achieve. But this is also due to the fact that there are now operational and sustainable examples of productive aquaculture firms in the region. Through improved communications and increased mobility, these success stories are receiving wide coverage and politicians everywhere want to get in on a good thing.

The "good thing" is also a result of service providers (including government), investors and producers willing to undertake new approaches. These new methods include new production systems previously untried or unproven in Africa (e.g., cages, tanks, etc.). The new methods also include new ways of approaching the problem; taking a business approach to aquaculture and fostering private-sector-led development. The public/private seesaw has established a new equilibrium with a much stronger voice from, and role for, the private investor.

Increased prices have been the specific stimulus for the recent surge in aquaculture investment. This has, in turn, promoted investor confidence which has had a positive impact on credit availability.

Credit is slowly becoming more available as lending institutions gain more knowledge about aquaculture and are less adverse at according funds to the sector's development. However, progress is slow and credit is still available on a relatively limited basis and at high interest rates.

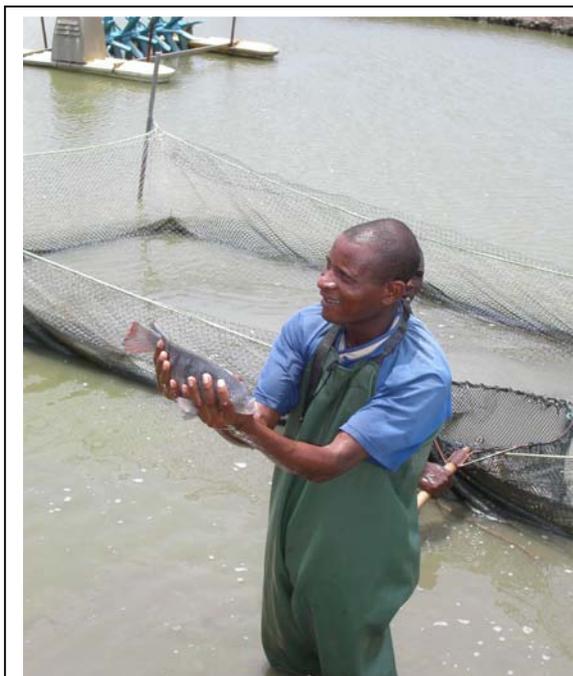


Figure 17. Growth of aquaculture requires capacity building along with (private) facilities development. Many investors do not want to apply extensive and/or outdated technologies when turn-key state-of-the-art farms are available (Angola).

Another key element in the growth of the sector and assisting in the rational promotion of aquaculture is the growing information capacity within the region. Although Africa is still not on the cutting edge, intra-regional communications and information exchange have improved immensely.

Improved access to information has also improved publicity for aquaculture, although this has both pros and cons. Word is getting out and successes are gaining visibility. This publicity campaign is further assisted by such structures as NEPAD and the Fish for All Summit held in 2005, which strongly endorsed aquaculture. Improved visibility has also made aquaculture the subject of numerous interventions championed by the NGO community. These extra-governmental organisations can help bolster sluggish public agencies and institutions. On the other hand, they require co-ordination and can easily be misled by false claims, if they do not have well qualified technical staff.



Figure 18. Capacity development goes hand in hand with the adage “necessity is the mother of invention”. Nigerian fish farmers who overcame inertia and built viable fish farms had to assume full responsibility for all activities from seed production to marketing. Here the owner/operator of a small family tank unit demonstrates how he produced his own seed in a three-by-five shed that served as his hatchery. Now the industry has grown and service providers are actively engaged in the market; growers can and should concentrate on producing table fish, buying high quality seed from industrial hatcheries.

Government institutions themselves are still suffering the aftershocks of major economic traumas of recent years. Nevertheless, while there has been a noticeable loss of institutional memory, the new staff are often better educated and even better motivated than their predecessors; not having been spoilt by the “golden years” when extra-budgetary funds permitted a varying degrees of lavishness. With effective technical support, and within the context of the new approaches to development mentioned above, the future of these agencies to oversee the development of the sector is promising.

The Need For National Strategies

Strategies (*cf.* page 13) serve as roadmaps that guide the sector, helping stakeholders achieve their designated objectives within the limitations of available resources. While essential, they are often lacking, neglected in favour of

policies and plans. Accepted methods were to establish policies as more specific aims, akin to strategic objectives in current thinking. These were then supported by a “*master plan*”, which was more of a review of the sector

in question, accompanied by a series of annexes which constituted a wish-list of donor-supported projects necessary to achieve specified objectives.

In the three-step process we propose for African aquaculture (policies → strategies → plans), policy objectives are broad and only quantified in general terms (the



Figure 19. Good harvests of high quality crops are feasible today if stakeholders plan carefully and take a business approach to fish farming (Nigeria).

“what” part of the process). Targets of specific plans, however, are precise in terms of quantity, quality and time (the “when, where and how much”). Targets contribute to objectives. Strategies are often not quantified but qualified. They assign roles and responsibilities (the “how”), serving as the conduits through which the plans operate to achieve broad policy objectives.

While many references define strategies and plans as being nearly synonymous, the present connotation of “strategy” is similar to the behavioural definition: a complex of adaptations serving an important function. In comparison, Webster defines a plan as: “a method for achieving an end”.

The policy broadly defines (*cf.* page 13) relative achievements with non-specific designations. The plan details each explicit achievement in terms of quantifiable outputs and inputs – magnitude of the product as well as time and other inputs required for it to be produced. The strategy describes how the sub-sector and its combined stakeholders will perform and interact to promote the smooth and successful implementation of the plan. Strategies define resources necessary for plans to meet their targets.

While policy objectives tend to be universal in their function, and plan targets may seem obvious, ways and means of achieving these are far less straightforward; particularly if considered within the range of resources available in most African countries. Within the prevailing context of limited human and financial resources, successful implementation can most often only be accomplished through partnerships and pooling of assets.

The strategy helps answer the difficult question of how to obtain needed results with limited resources. As the question is difficult, it has long been avoided and many countries do not have specific strategies for the development of their aquaculture sector. With the growth of the sector at a

critical stage, these questions should now be addressed and the best means is probably through the development of strategies.

As a final note, in different contexts some observers have referred to national aquaculture strategies or national aquaculture strategic frameworks. From a practical standpoint, these two descriptions can be considered as synonymous. Although the “framework” is more synoptic, the processes, content and context are basically the same.

Box 11 NGOs: Non Governmental Organisations (NGOs) have become very popular development tools in recent years. To many, they are equated with cheap ways of delivering services. In various African countries NGOs have assumed important roles in aquaculture development. In some cases NGOs are the nuclei at community level that stimulate interest in aquaculture; whether or not they have the technical capacity to support this activity if adopted. In other cases, NGOs are actively sought as surrogate extension providers as government agencies become less and less able to meet producers’ needs. It is probably true that the NGOs themselves have the best intentions, but they often seem to validate the concern that a little knowledge can be dangerous. NGOs, with the best intentions, design local aquaculture interventions in complete absence of any government inputs and not infrequently in contradiction to the direction governments have chosen for the sector’s growth. In extreme cases, they have introduced exotic culture species with no approval from the relevant authorities and no concerns for the long-term implications. This is not to imply that NGOs do not have and should not have important roles to play in the future development of the sub-sector. By their mandate and function, NGOs can contribute significantly to the development of aquaculture, but their inputs should be screened for quality control, co-ordinated and harmonised by some form of central government structure.

Priority Setting

There are two main objectives that are commonly promoted for aquaculture: food security and economic growth. Contrary to popular belief, these are somewhat mutually exclusive. The first thing one needs to do in establishing the strategy is to clarify which one is the priority.

Despite the predilections of politicians who tend to think first about the prices of food in urban markets, food security in Africa is largely a rural affair. An average of 80 per cent of Africans still lives in the countryside and many of these face seasonal food shortages. Policies that maintain low food prices for the benefit of the minority of Africans living in cities are generally counterproductive, discouraging production and exacerbating overall food insecurity.

In addition to being mostly artisanal farmers, the rural, food-insecure population is also the poorest segment of society. These people are not in a position to pay for either food or the extension support services necessary for them to produce their own food. Many development interventions have been devised to help these people, and many have achieved short-term success,

but few have achieved sustainability. Once the subsidies are withdrawn, the project collapses.

Unless governments are able to consider long-term subsidies in terms of direct food hand-outs, or subsidized extension services, neither of which is affordable for cash-strapped African governments, many rural Africans will remain food insecure.

Sustainably putting more cash in the hands of the rural poor so they can buy food will require economic growth, the second major objective of aquaculture. However, artisanal food production systems of the type tested repeatedly over the years and described above under the section: “what went wrong” have failed to produce any significant growth. This is because most projects have relied on local (village) markets, most of which are cash-poor and rely largely on barter. With no significant cash-flow being generated by the farm, there is no money to reinvest, bank or spend to create economic activity.

In the capitalist system under which most people live, economic growth depends upon the establishment of viable businesses. However, the constraints to business in rural Africa are substantial: poor infrastructure, unskilled labour, high transport and input costs and low access to technical expertise. Calculating the minimum investment size at which a business can be profitable is a common practice and shows that in most cases, very small-scale businesses cannot make money in rural areas.

Depending upon the capacity of local government and the willingness of donors to provide money to support rural business initiatives, one could imagine a range of strategies to help them grow. The minimum, and probably the only level of support that rural investors might reasonably expect in the short term, is the provision of technical assistance. However, the level of training and extension methods employed by the existing support services is inappropriate to this type of investment. Most of the aquaculture training programmes and extension systems are funded by external donors who want to reach the lower ranks of society and have thus favoured technologies than can be easily scaled down or simplified for poor users. The opposite is what is needed for commercial investors. Extension agents should be trained in technologies that can be adapted to the calculated minimum profitable investment and then scaled up as the business grows.

Either of the major objectives for aquaculture, food security or economic growth, can be achieved, however, to properly design a strategy, one needs to be sure which objective is being targeted. For food security to be realized directly, one needs to concentrate effort on the rural poor, preferably by subsidizing extension, especially marketing, support. This has to be viewed as a long-term investment, but could well be worthwhile, if affordable.

If one wants to target economic growth, one needs to find means of supporting the growth of rural businesses that are of a sufficient scale to produce adequate profits. This will probably mean abandoning the poorest of the poor as a direct beneficiary of extension services. Providing direct

technical assistance to investors who want to build fish farms in rural areas as a money-making venture, which can then serve as an engine for general economic growth and rural employment, would probably be the cheapest and quickest way out of poverty.

Strategic Approaches

Regardless of which main objective is sought, aquaculture is a multifaceted enterprise and encouraging its development requires a broad-based and holistic strategy encompassing many technical aspects and the interests of many stakeholders. The following sections discuss essential components to consider in the elaboration of any national strategic plan for aquaculture:

Seed

Seed has been long acknowledged as one of the pivotal issues in aquaculture development; specifically the lack of good quality, affordable seed. Seed is also the technical entry point where most aquaculture technicians can have the greatest immediate impact; reliable availability of better quality seed providing rapid improvements to mediocre harvests, increasing the number of cycles per year and lowering costs of production.



Figure 20. Seed is arguably the linchpin for expanded national aquaculture growth. Seed production technology is, to a large extent, known and distribution can be addressed via various means. Viable seed supply business must be established if the sub-sector is to expand and these firms require a critical mass of customers if they are to make a profit (Angola).

A clear lesson from past projects is that seed production is the domain of the private sector. Closely aligned to this message is the fact that seed distribution is as much, or more, of a challenge as seed production.

For producers interested in maximizing profit (i.e., commercial farmers), seed should be seen as a commercially produced, purchased input, and not something collected from the bottom of the pond at harvest. Most commercial aquaculture producers will find that the rather complicated process of on-farm seed production is not the best use of available resources and that, seed is best obtained from dedicated hatcheries and nurseries where seed production and delivery is the core business.

Under the overall umbrella of a private sector initiative, there are many options for seed delivery. A single hatchery may produce the “stocker-size”

animal or several operators may rear different stages between fry and juvenile. The decision as to which method fits the given circumstances is one of economics: how can a reasonably priced, quality product reach the grower?

Private, commercial seed supply implies the adoption of tried and true technologies. This, in turn, implies the use of species for the reproduction of which there is an adequate knowledge base; experimental reproduction of new species should remain the domain of the researcher until the technologies are sufficiently well established to attract investors. In some cases, wild-caught seed may still be an option as long as biodiversity and environmental conservation are not adversely affected.

Seed quality, particularly in terms of known age of stocking material and uniform size, can be improved significantly even with existing genetic material. Nevertheless, as producers improve their management practices to the point where inter-strain differences in performance are made manifest, they will demand improved strains. Strategies need to foresee this inevitability and allocate responsibilities for the development and maintenance of a breeding programme. As fish breeding continues to be experimental, some kind of research involvement is needed and might best be sought through a private-public partnership, with public institutions and infrastructure playing leading initial roles and the private sector taking the results directly and applying them on-farm.

Buying fingerlings represents a substantial investment and obliges farmers who want to make money to invest proportionally in other inputs so as to



Figure 21. Locally available, good quality and affordable fish feed is a critical factor if aquaculture is to expand and contribute significantly to economic growth (Nigeria).

justify and recuperate the cost of the fingerlings. Being thus obliged to rely on a private seed supplier, hatcheries and growers will naturally evolve into a network relationship. This will contribute directly to the establishment of operational clusters of farmers needed to create the critical mass necessary for efficient delivery of support services.

Feed

As with seed, all scales of commercial producer should see feed as a purchased input, rather than something one finds lying about on the farm. Unlike with seed, however, feed quality, prices and availability are less under the control of the producer and the aquaculture technician. Animal feeds rely on agricultural

products and should not compete to the detriment of lower-income humans for the use of these inputs. Nevertheless, off-farm feed inputs are necessary if harvests are to improve.

There are two main options for feed supply: purchase ingredients and prepare feeds on-farm or purchase prepared feeds from commercial mills, be they micro or large businesses. In both cases, the feed may be supplemental or complete. Aqua- feeds are most effective when pelleted and pellet quality (especially water stability) will be an important factor.

Transport and delivery of feeds and/or feedstuffs will also be critical in determining profitability and minimum investment size, and may well be facilitated through localised distribution nodes similar to the seed supply centre, further reinforcing network cohesion and inter-dependence.

Credit

The 1999 Africa Regional Aquaculture Review (CIFA/OP24, FAO-RAF 2000 – Executive Summary appended) concluded that most non-commercial farms hoping to achieve food security objectives are not constrained by lack of credit. While this may remain the case, commercial farmers seeking economic growth objectives do need capital to purchase inputs of feeds, seed, equipment and infrastructure in sufficient amounts to meet minimum investment targets. Crop insurance has also been mentioned as a possible contributor to investment security.

Strategically, many small and medium scale commercial investments will produce more overall economic growth than a few big farms. However, in most developing countries large (industrial) producers find it much easier to obtain credit than small- and medium-scale commercial operators. For this group, the capital requirements can be modest and correspond well to a variety of community-level micro-credit mechanisms.

Marketing

The fact that a product might be scarce in the market does not mean that anyone who produces that product will find it easy to sell. This is especially true for aquaculture products which are frequently more expensive than, albeit often of lower quality than products coming from capture fisheries. Accordingly, the market is a very important element of any strategy; but one that is often neglected or completely forgotten. To be profitable in the long term, aquaculture investments must be market-driven and the aquaculture sector overall must be investor (private enterprise) driven.

Global markets are a reality as numerous African aqua-producers target North American and European consumers. Concurrently major national and sub-regional African markets remain under-supplied with countries spending millions in hard currency for the importation of fishery products.

Strategically, marketing issues should not be limited to the sales and distribution of aqua-products, but also the marketing of production inputs such as feed, seed, equipment, etc.

Information

Information includes extension, outreach and non-formal education. There are two essential dimensions to this key element; information quality and information delivery. Much of the developmental information generated is “explicit” in nature. Explicit information is derived from the scientific process of observation and analysis and then transcribed into a format for diffusion. This progression takes considerable time, with a substantial lag before the information is available to the consumer. As a consequence, explicit information is used extensively by students and educators but tends to be enough behind-the-times not to be particularly useful to decision makers and others on the cutting edge. Deciders of the public and private sectors, require “implicit” information which is in effect un-coalesced knowledge and expertise that is articulated on-the-spot to address a specific issue at a specific time. Thus, while implicit information is the more indispensable for development and investment decisions, the spontaneity required makes it difficult to make available vis-à-vis “stored” explicit information.

Delivery of any information is seemingly equally problematic and some have considered extension and outreach as the greatest challenges confronting the development of the global agricultural sector. Preceding chapters have described various attempts aimed at establishing aquaculture extension services – most of which have failed. Strategically, information dissemination must take a polymorphic approach relying on a mixture of direct and indirect communication channels ranging from the mass media to farmer-to-farmer and agent-to-farmer personal exchanges.

Education

Education is intrinsically linked to information and few would argue that aquaculture education is needed across the full spectrum of the sector from the producer to the highest level decision maker. It should be clear by this stage that this education must be applied and applicable. Equally important is to strategically assess the economies of scale for providing education at different levels and for different target groups. Education is a question of the ability to deliver, the cost to deliver and the demand for delivery. A growing aquaculture sector will manifest high demand for education and training at the producer interface, including individuals from both private and public sectors. However, as one moves up the hierarchical ladder, fewer and fewer individuals are required and the specific costs per person higher. At these levels, economically viable numbers of trainees or students may only be found at sub-regional or regional levels. Strategically, this argues for an intra-regional education and training network that can positively address these economies of scale.

Research

There is no doubt that research has played, and will continue to play an important strategic role in the development of aquaculture. However, it is also likely, albeit not categorical, that researchers perpetually identify research as the key to development; citing the pressing requirements for more resources to address critical research needs. Globally there is a large body of relevant technology and methodology which could and should be at the disposal of African aquaculturists; but which often is not. Thus, the essential factor is determining what exists but is inaccessible and what remains to be “discovered” through research.

Examples of fundamental unknowns that rely on research effort include, as indicated above, the reproduction and culture of heretofore unutilised species as well as the improvement of existing genetic material. At the same time, such topics as use and preparation of local nutrient inputs (feeds and fertilisers), catfish or tilapia hatchery techniques and stocking ratios, etc., while admittedly having knowledge gaps, do not represent the “burning” issues where there is the highest return on research investment in terms of production for the sub-sector.

Cross-cutting elements

Strategic approaches to aquaculture development are underpinned by some fundamental principles based on years of experience which apply to all rural development options and interventions. These cross-cutting and common elements include the concepts of critical mass, high potential areas, high potential areas and profitability.

Aquaculture cannot be practiced everywhere; it has its discrete set of prerequisites which must be respected. In spite of the enthusiasm of a would-be fish farmer, the best service one can provide this individual is to say “no” if the site does not have sufficient water, suitable soils, market access, etc. When we try to bend the rules the outcome is rarely favourable and the dissatisfaction on the part of the farmer much greater than it would have been if the pond had never been built.

Respecting the norms means, *de facto*, concentrating effort in high potential areas. These areas need not only the biophysical potential but also should meet economic capacity and social suitability criteria. Where these prerequisites converge, there is the greatest chance for success and the best opportunity for developing sound and sustainable demonstrations of successful aquaculture.

This leads to the next cross-cutting element: profit. Activities along the entire value chain need to be profitable. Concentrating on high potential sites will improve the chances of profitability but will not take the place of a comprehensive business plan.

Profit also has a density dependant function when taken in the context of a national programme. This is the concept of critical mass. Part of the

marriage between systems and sites is the verification that a critical mass can be achieved and that this critical mass can be composed of profitable, hence sustainable, enterprises.

How To Implement A Strategy?

At present, strategies or strategic frameworks have been elaborated for Cameroon, Zambia, Ghana and Madagascar. A strategy development process has begun in Angola and is likely to start soon in DR Congo and Nigeria. However, no strategy has yet been implemented.

Implementation is, in the first instance, an administrative process that formalises the strategy. In some countries, this process necessitates legislation while in others it is less complicated and can be affected through official ministerial approval.

However, the strategy is not an ironclad rule but an iterative process. To a large extent, by articulating the strategy and discussing it in stakeholder fora, the elements gain visibility and varying degrees of acceptance.

In an ideal world, the strategy is elaborated in a participatory way with due attention given to the guiding principles and best practices. The resulting document, although only the first step in the process, is then formalised according to the prevailing procedures. This legitimises the strategic approach and its inherent elements.

In theory, the approved and adopted official strategy, as an iterative and flexible guide, is then overseen by a National Aquaculture Task Force composed of representatives of key stakeholder groups including the public and private sectors and civil society. The Task Force is charged with the responsibility of up-dating and revising the strategy as the sector evolves.

In the final analysis, formal approval and adoption with the subsequent monitoring by a Task Force requires government initiative. If there is adequate political will, the process could move quickly and efficiently. But governments are by nature cumbersome and often inefficient. What is to become of the strategy if it is elaborated and then lost in the void of bureaucracy?

If the strategy follows the guidelines presented in the present document, it will promote commercial aquaculture. Accordingly, in the absence of sufficient public sector political will, the private sector should have a vested interest in keeping the strategy “alive” and up to date.

In this scenario, the stewardship of the strategy could be assumed by a national aquaculture association. This should not be confused with the farmers’ associations or groups operating at local or community levels to directly assist producers; expediting input availability, market access, extension support, etc. The national association should be a political lobby group open to one and all. The national association should, by default, harbour the strategy and ensure that it reflects changing producer needs and opportunities. The national association could have other ancillary

functions such as producing periodic newsletters, maintaining databases of producers or linking to regional technical organisations.

Best Practices

Adoption and adherence to best practices for the protection of the environment and insurance of high quality inputs and outputs is essential for the sustainable growth of aquaculture. Many of these practices are incorporated in the *FAO Code of Conduct for Responsible Fisheries*.

Obviously, governmental adoption of codes and covenants is a long way from on-the-ground implementation. This gap between theory and practice was less important when the majority of the sector was composed of scattered, non-commercial farms. These farmers with fishponds functioned at a low enough level that it was improbable their practices would have any significant off-farm impact. Nonetheless, any stakeholder has the potential of having a negative environmental impact, particularly with regard to the introduction of exotic or controlled species as well as by the sale of sub-standard products (inputs of foodstuffs).

As the sector evolves to a more commercial orientation, best practices become increasingly important; not only for their potential deleterious impact on the overall physical operating environment but also on the political and economic environments, including influences on such critical areas as lender and consumer confidence. For sustainable profitability, it is incumbent on all stakeholders to demonstrate transparency and adherence to accepted norms.

On the production side, major areas of interest involve environmental impact. This requires sound environmental impact assessments (EIAs) prior to site development, as well as effective monitoring and control mechanisms. Specific issues include the quality and volume of discharge waters, on-farm use of chemicals and pharmaceuticals and potential introduction of alien or genetically improved organisms. With respect to the supply side, aquaculture needs to control its products; be they feed, seed or food fish (or other aqua-products). These control procedures need to be based on solid public/private partnerships.

At present, few governments have the ways and means to exercise the level of control necessary to effectively monitor the sector and its products. Licensing and certification of different segments of the value chain is one way to initiate control measures. However, qualified public sector staff will ultimately be required to verify and validate activities at farm level.

Regional Issues

There are economies of scale for aquaculture development which argue in favour of a regional approach. While capacity building at all levels is a priority for all national programmes, the requirements for human capital on a country by country basis are relatively small and it would be hard for a single country to justify a world-class aquaculture training and education

institute to fulfil only national staffing needs. The same types of analyses apply to research where top-notch facilities are expensive; the costs most easily absorbed when shared among several countries.

In the 1970s, UNDP and FAO established regional aquaculture centres as part of the global Aquaculture Development and Coordination Programme (ADCP). One legacy of ADCP is the Network of Aquacultures Centres for Asia (NACA). NACA has been transformed from a regional centre within a global programme into an active Intergovernmental Organisation (IGO) supported by countries in the region (Asia) and providing high quality services to the region. The sustainable positive impact of NACA on aquaculture development in Asia has led to a call by FAO and its development partners for the establishment of a similar IGO for the Africa Region: NACAf – Network of Aquaculture Centres of Africa.

A number of institutions in Cameroon, Côte d'Ivoire, Kenya, Malawi, Nigeria, Uganda, Zambia, and South Africa have expressed interest in being part of such a network. In addition to specific aquaculture institutions, sub-regional Economic Communities (RECs: SADC, ECOWAS, CEMAC, etc.) have periodically indicated interest in assuming some form of co-ordination role for a regional or sub-regional aquaculture programme.

If implemented, NACAf would have a co-ordinating function for the region; liaising with other regional bodies and institutions, co-ordinating research and training, providing direct technical assistance, etc. NACAf could even have regional oversight duties for monitoring the implementation of national strategies as most of these will have similar templates and, in the future, rely on NACAf for varying degrees of assistance.

In the short term, NACAf could gain some institutional support from the Committee on Inland Fisheries of Africa (CIFA) which has endorsed its establishment and provides a loose intra-regional structure which could facilitate early action.

Risks

When aquaculture came to the forefront as a development tool in Africa in the 1970s, its future was so fraught with over-expectations such that it could never achieve realistic goals of improved food security and economic opportunity. In the current millennium there has been a changing of the guard and many of aquaculture's past failures have been forgotten. There is once again political and investor willingness to support aquaculture; but this support must be couched within realistic boundaries. It must be born in mind that aquaculture can contribute to market supply, economic growth and national development. But, it is not a cure-all.

While the new team of stakeholders may have forgotten many of the past pitfalls, this dwindling institutional memory also means that there has been a loss of both positive and negative experiences as well as lessons learnt. Specific snags that appear in many current national programmes include:

- *Extensive absences by key national decision-makers and technicians* – improving resource levels means that there are more study tours, more meetings and, in general, more excuses to be out of the office;
- *Instable structures* – new attention to aquaculture has prompted some to hastily establish a variety of institutional and community structures which may be found to be built on shifting sands as they are a quick response to a perceived problem which is not fully understood and/or a quick fix to enhance eligibility for external support with the prerequisite solid technical foundation ;
- *Conflicts over resources* – growing and more concentrated human populations are leading to increasingly grater competition, not only for human and financial resources, but also for essential natural resources;
- *Poor quality control* – few countries have functioning mechanisms to control the quality of aquaculture inputs or outputs, all the while such controls are more and more important in globalised markets;
- *Poor evaluation & monitoring* – as with quality control, little, if any systematic evaluation and monitoring is undertaken and the structures for doing so are often weak or nonexistent;
- *Continued pressure applied for more research* – as researchers tend to be among the more erudite and vocal of stakeholders with a vested interest for continued and even expanded research, there is, in some cases, a tendency to support research for research’s sake – there are topics that require participatory and demand-driven research, but there is also a great body of information which is available and not utilised;
- *Experts* – an old maxim says an expert is some one who is 50 kilometres from home – in many ways aquaculture has had an almost paranormal aura and it has been difficult to judge who really is and is not an expert – this phenomena has been aggravated by the growing concentration on using local expertise – expertise which, in the case of aquaculture, may often be realistically lacking and inputs chosen from a proxy source for political expediency;
- *Communications* – in spite of impressive improvements in communications technology in the Region, there are still noteworthy communications inefficiencies;
- *New is better syndrome* – as aquaculture is mainstreamed, there a tendency to be attracted by reports of seemingly new, high performance tools which may or may not be appropriate to the prevailing circumstances;
- *Too many chiefs* – in some of the evolving structures appearing at various levels to “deal with” aquaculture, it seems as though there are indeed too many chiefs and not enough practical “fish handlers”.

CONCLUSIONS & RECOMMENDATIONS

Decades of support to aquaculture in Africa have not been for naught. Important lessons have been learnt and aquaculture is now a known commodity throughout most of the region.

In terms of financial support, from both public and private sources, the doldrums of the 90s have led to the renaissance of the new millennium. In practical terms, this translates into renewed political will and here-to-for unseen levels of private sector investment (Appendices I & II). This political will must be used wisely and carefully converted into tangible increases in production from the sector.

An national strategy (Appendix III), supported by a wide range of stakeholders, is a necessary and positive step, even if not formally adopted or written into law. An awareness of the new paradigms is essential. New roles and responsibilities will promote growth, improve quality of products and increase accountability.

Extension, outreach and distance learning, as interrelated parts of the same processes of education and technology transfer, are critical elements for any national programme but remain outstanding problems with no easy solution (Appendix IV). Unlike many technical issues being confronted by the aquaculture sector, extension will likely not have a common solution across the region. A variety of public and private interventions will inevitably be relied upon in the short- and medium-term. In the longer-term, sustainability will likely depend upon some form of pay-as-you-go service where producers will invest in high quality external technical assistance, either from input or other service providers.

While extension may be the exception to the premise of common solutions for common problems, commonalities exist and are likely to remain for some time to come and there will continue to be a need to provide assistance to addressing these collective concerns. Some form of regional structure such as the proposed NACAf may be the most expeditious and logical mechanism to service this need.

Overall, a practical and applied approach is necessary. For the sub-sector to grow it needs people who know how to grow fish (Appendix V). This is not a time for theory and debate, but a time to make difficult decisions and take decisive action to ensure that the momentum that has developed over recent years can guide the sector forward and see Africa become a major global aquaculture producer.

WHAT NEEDS TO BE DONE?

Preceding pages have attempted to document past experiences, both positive and negative, as background for a series of lessons learnt. These lessons have, in turn, been used as the bases for strategies to support aquaculture development. These strategies are elaborated through an iterative and participatory process involving all stakeholder groups. In theory, strategies

are to become formal instruments to guide the sector. Even in the absence of the formal instrument, this process for analysing the sector and deciding on what actions to take is a worthy one. Yet, there is much to be done.....

Governments

Government that have not embarked on the strategic process should do so. As the number of finalised strategic frameworks increases, newcomers will be able to benefit from these to avoid undertaking the whole process, rather simply reviewing those instruments that have been developed and picking those elements that are most suited to national conditions and priorities. With or without an approved national strategy, governments will need some form of national oversight capacity to monitor the growth of the sector.

Within their national structures, governments will need to facilitate investment. This will include such items as establishing a “*one stop shop*” for would-be investors where the entrepreneur concerned can obtain all relevant information in an easy to follow format. This facilitation should be expanded to such activities as EIAs which, though critical, need to be practical and undertaken in collaboration with the private sector, using the best available information.

Governments will need to assess carefully their options for the provision of aquaculture extension and outreach support. While no cook-book approach can be offered, there are a number of possibilities including a much greater emphasis on private sector channels.

Governments will also need to carefully assess their aquaculture-related programming with particular reference to research and education. Research tasks need to be demand driven and educational needs, for all levels, need to be in relation to the realistic needs of the sector. These two areas of public sector investment need to be scrutinised in regard to economies of scale and options for sub-regional or regional integration and/or cooperation.

Governments need to assiduously review direct and indirect financial support to the sub-sector. While “gifts” should steadfastly be avoided at all costs, there are other mechanisms to facilitate growth including reduced or no import tariffs on aquaculture materials and supplies as well as campaigns to educate lending institutions about the profitability of aquaculture.

Most importantly, governments need to understand and accept that their roles are changing. There should be no reticence to divest and reform. Government has an essential role in the future development of aquaculture, but this is a new and rapidly evolving role, more of a facilitator than a prime motivator. If government does not rapidly and whole-heartedly take up the challenge, it will run the risk of being sidelined to the ultimate detriment of the entire sector.

Industrial Producers & International Investors

Big business and big money can move mountains. When the resource base is large, action can be very quick and decisive. It can, in fact, be so quick and decisive that it overtakes the natural evolution of the sector. This steamroller effect can, in the short term, create more jobs and put more fish (or other aqua-products) on the market; but, it can also be so hasty as to border on being rash and reckless. In many cases, big business wants things done yesterday and no forward movement, be it ever so progressive, is ever fast enough.

This precipitous way of doing business has resulted in the illegal introduction and translocation of numerous alien and un-approved species. It has led to ill-advised site selection and consequent degradation, and the investment of scarce financial resources in more than a few White Elephants.

There is no question that there is a high level of interest from all segments of the private sector in investing in aquaculture. This is definitely a good thing. Nonetheless, investments and developments need to be made rationally and with due consideration to the process. Governments can facilitate, but this is only of use if investors agree to follow the prescribed procedures and adhere to the prevailing rules and regulations.

Industry must make a public commitment be responsible stakeholders and to abide by established procedures. Moreover, given the nascent stage of the industry, industry will have to assume at least some of the costs for research and development. Whether with full or partial support, industry needs to invest to be able to recover their venture capital. Better feeds, better information channels, improved seed, more applicable technology, expanded market access – these will all benefit the big producers but have spin-off affects that will benefit smaller produces and the sector as a whole.

Small- & Medium-Scale Commercial Producers

While industrial producers can rely on their own resources, small- and medium-produces still need external assistance. This assistance can come from government, producer associations and/or the international community. In the first instance, however, assistance must come from the producers themselves. The new strategic approach of concentrating in high potential zones will automatically lead to a clustering of profit-oriented producers. But these individuals must overcome their traditional and cultural aloofness and actively “bond” with other members of the cluster. They must truly buy into the principle of the power of the group and become team players.

This is not to imply that formal producer structures following Robert’s Rules of Order are required. There is a whole spectrum of opportunities in terms of assembling people with common problems and aspirations. Certainly the ability to “pull down” services from government and international donors should be one of the prime motivators.

In the final analysis, small- and medium-scale operators cannot “go it alone”. They need some form of structure at the cluster level to organise their operations. They also need some broader umbrella structure to give them a political voice. As with other previously mentioned matters, here too there are economies of scale – a political voice is heard when it represents a sufficiently large group which can potentially exert political power. If this level of engagement cannot be achieved at national level, sub-regional or regional structures need to be considered.

The Non-Commercial Segment

The non-commercial segment exists and will continue to do so. This is as it should be. Non-commercial stakeholders are legitimate actors in the sector. However, by choice, their level of operations is such that it does not warrant significant public or private sector investment. They will benefit through trickle-down actions from the overall development of the aquaculture industry. Non-commercial farmers closest to clusters will benefit most while those in the most remote areas will continue to have the greatest challenges when seeking assistance or inputs.

Service Providers

One of the major actions that defines this phase of aquaculture development is the emergence of service providers. Private and public service providers are crucial for the continued positive evolution of the sector.

Seed production and distribution has been discussed in detail as an activity, which, when undertaken profitably by the private sector, can be a vital catalyst to the growth of the sector. Seed distribution centres, as hatcheries or nurseries, can also serve as the hub of a cluster. Seed distribution, in large African countries, is a challenge. In addition to hubs that are tactically well chosen, the industry needs to rely on public transport for distribution. With the ready availability of good quality plastic bags and pressurised oxygen, there is no reason that relatively large quantities of seed cannot be packaged for day-long shipment within any country.

Feed is another area where private service provision/specialisation is key. In some cases this may be distribution of imported feeds while in other cases it can involve milling and packaging of locally produced products of acceptable quality.

Private extension is also an area of growing interest. There certainly are possibilities for private extension programmes as well as for private/public partnerships. Whatever mechanism is used, the provision of appropriate and timely information will be challenging but highly valued by producers. Providers of information will be influential and must take care not to disseminate misinformation.

Private pond construction services, both mechanised and manual, exist in several countries. As the sub-sector grows there will be increasing demand for these services and a need to validate the capacity of the service providers.

Other areas which may appear in the service sector as the sub-sector and industry grow could include animal health and food quality control. For these specialities, as well as all other service provision, the state will need to keep pace with the development of specialised services, establishing standards and putting in place mechanisms for certification and quality control combined with regular reporting and periodic monitoring.

Civil Society

Civil society outside the production and service activities constitutes the target group of the sector; the customers for aquatic products. It is necessary to keep in touch with this indispensable group and to bring them on board for pivotal decision making. The sector is accountable to civil society. Nevertheless, as the beneficiaries of the sector, civil society has a responsibility to keep itself informed about its workings. On several occasions, concerns expressed by civil society have resulted in the expenditure of great sums of money only to find out that these concerns were ill-founded. Governments need to work hand in hand with civil society, especially civil society organisations in areas of high aquaculture activity, to ensure there is a free flow of good quality information.

International Community

The international community and donors still have an important role to play. While there is growing private sector investment, growing awareness and growing political will, the sector remains vulnerable. It will take time for solid roots to develop.

Ironically, at this time of an aquaculture renaissance, most African countries are in severe economic straits. Furthermore, the doldrums of the 90s have resulted in a significant loss of experienced and tested human capacity; a loss to the combined effects of HIV-AIDS, early retrenchments and the Diaspora. In the aggregate, growing political will is confronted with the realities of greatly reduced public coffers as well as greatly reduced human capacity. Countries look to the international community to assist in filling this gap.

In regard to external support, it is probably worth mentioning the need for donors and other external supporters of African aquaculture to adopt a common and current approach. There remain cases of donors following antiquated practices and acting in isolation rather than partnerships. There are specific cases of direct support for the building of new government stations, in spite of the convincing arguments for divestment and privatisation, and of provision of a wide variety of “gifts”, although the negative impacts of such give-aways are well documented.

It is necessary for governments to help set the agenda in consultation with representatives from all national stakeholder groups. Donors and others from the international community should then see how their own priorities and resources can be merged into the national programme to the benefit of

all – and not the inverse, where national programmes are moulded to meet donors’ requirements.

There is a West African proverb that states: “*eni man fit sen ai fo obasia wata*”. In other words, “anyone can see across a river” – achievement demands effort, while energy directed toward a goal offers a reward. African fish farmers have been looking across the river for years, seeing the opportunities on the other side but not being able to get there. There is now a chance to cross the river – do not let it slip away.