Regional Workshop on

Forests and Droughts:
The roles of trees and forests in building resilience against droughts

10 - 11 August 2015
Anantara Bangkok Riverside Resort and Spa, Bangkok, Thailand

Workshop Summary Report

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Regional Workshop Report[1]

Workshop Overview SYLVIA MICLAT

Objectives: The regional workshop on "Forests and Droughts: The roles of trees and forests in building resilience against droughts" was held 10-11 August 2015 in Bangkok to:

- share knowledge and experiences on impacts of droughts on forests and forest dependent people;
- share experience on policy measures and their implementation to tackle impacts of droughts on forests and forest dependent communities;
- provide suggestions for regional and country level action/intervention to promote more effective management of forests and trees to mitigate the adverse impacts of droughts.

Flow: Day 1 of the workshop was dedicated for presentations from eight case study countries (Australia, Bangladesh, Bhutan, China, India, Indonesia, Philippines, and Samoa), each followed by a Q&A session. Day 2 was composed of discussion sessions to aid regional synthesis and review country reports. In the morning, the forests and droughts team members were divided into three small groups to: (i) identify strong commonalities and/or important differences among experiences of various countries in observed impacts, future implications and ways to build resilience against drought; (ii) craft recommendations for enhancing people and forest resilience to drought, as well as key messages for target audiences. The afternoon was devoted to feedback sessions wherein each country author met with a peer reviewer to discuss how to improve the submitted first drafts. Appendix 1 details the workshop agenda.

Participants: Through the creative facilitation of Yurdi Yasmi, introductions among the 15 participants were woven into an ice breaking activity which emphasized cultural diversity in the group and the importance of identifying appropriate communication approaches. Appendix 2 presents the profile of participants.

DAY 1

Welcome Remarks PAT DURST

The Asia and Pacific region is prone to natural disasters. Seven of the top 20 countries vulnerable to natural disasters are in this region, with the top four being: (1) Vanuatu; (2) Tonga; (3) Philippines; and, (4) Japan.

FAO has done a wide range of work in forests and natural disasters to give a lot more attention to its strategic objective of increasing resilience of livelihoods to threats and crises. These efforts include training workshops for Pacific islands staff and sub-regional planning workshops on increasing resilience to help incorporate this topic into programming efforts.

FAO's publications on forests and natural disasters include: forests and floods; forests and

[1] Report prepared by Kumiko Kubo and Rowena Soriaga, with support from documentation by Sylvia Miclat. Please contact rowenasoriaga@asiaforestnetwork.org for any omissions or errors in interpretation of workshop discussions.

landslides; and the role of forests and trees in relation to tsunamis. The recent issue of Unasylva focused on forests and natural disasters. An online module is being developed as part of the SFM toolbox.

The good news is that we can do something about it. By investing in disaster preparedness such as intensified monitoring and early warning systems, we can reduce disaster risks. Japan is a good example of what is possible. While Japan is the 4th most vulnerable country to disasters, it was able to improve its place on the World Risk Index down to 17th because it has greater coping capacity and adaptive strategies.

Trees, forests and wood can play major roles in building resilience to disasters. However, we must also be careful not to overplay the role of trees in disaster mitigation, and raise awareness on the limitation of trees and forests as they cannot be expected to do everything.

Setting the Context ROWENA SORIAGA

Recalling the key questions and agreed outline for the draft country reports, a simpler structure was proposed to streamline the final versions. This structure was used to present a regional perspective for the forests and droughts study.

Country report outline	Final country report
1. Abstract 2. Country profile	1. Context
3. Drought in the country 4. Rationale for case study 5. Drought impacts on forests and people	2. Observed Impacts (Key question #1)
6. Likely implications of climate change on droughts and forests	3. Future Implications (Key question #2)
7. Lessons learned 8. How to promote a better future	4. Ways to resilience (Key question #3)

Regional Context: Defining drought conceptually and operationally

Because climates are so diverse across different parts of the world, it is difficult to provide a single definition for drought. While there is general agreement on drought's conceptual definition, the operational definition to address its impacts may vary across countries. Conceptually, drought is defined as deficits in precipitation, soil moisture, and/or stream flow and groundwater. Operationally however, countries have different ways of defining when they are in deficit, based on their thresholds for dry spells and droughts. For example, the Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG) announces drought when average rainfall falls below 50% of normal conditions, while for the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), the threshold is 60%.

Factors contributing to drought include: precipitation, evapotranspiration, wind speed, El Niño Southern Oscillation (ENSO), other natural modes of climate variability, and feedbacks, i.e. when two or more climate extremes mutually strengthen one another. Research suggests that these feedbacks may occur more frequently at this stage of our planet, an epoch being referred to as Anthropocene because human impacts on ecosystems have become so pervasive (Rockström et al 2013; UNISDR 2015). Since many ecosystems are now approaching tipping points beyond which recovery is difficult or impossible, ecological zones are also important in understanding hydro-climatic extremes in Asia Pacific, including droughts.

Observed Impacts: Linking drought data with impacts on people and forests

A global and regional perspective on impacts of drought can be obtained from the Emergency Events Database (EM-DAT). UNISDR used this database to produce a global map to depict drought frequency over 30 years (1974-2004) at the sub-national level. This map shows that in the Asia-Pacific region, the most number of recorded drought events are in certain localities of Australia, China and India. An analysis of the EM-DAT database for drought reference years in Asia-Pacific from 1900-2013 revealed that: 2004 is the year with the most number of people affected by drought; 1993 is the year with the greatest amount of damage recorded; and 1999 is the year with the most number of countries reporting drought occurrence in their areas.

Data and monitoring maps on droughts or precipitation give numbers. For our forests and droughts study, we would like to tell the stories of people on the ground in the face of droughts.

In an attempt to find connections between global datasets and observed impacts of drought at the field level as documented in the draft country reports, drought reference years were compared. It was found that four focus countries of this regional study are providing field-level evidence for impacts of drought reference events included these global datasets (Australia, China, India, Philippines). Furthermore, four countries are documenting impacts of drought reference events that have not yet been recorded in these global datasets (Bangladesh, Bhutan, Indonesia, Samoa).

The 8 draft county study reports identified a total of 21 locations as drought-hit areas. A wide array of approaches were used to document the observed impacts of droughts, including field visits, risk perception surveys, focused group discussions and semi-structured interviews.

Future Implications of Climate Change on Droughts, Forests and People

The 2014 report of the Intergovernmental Panel on Climate Change (IPCC) describes little on future implications of climate change in Asia and the Pacific, attributing to not having sufficient evidence, apart from those in Australia and China. Still, IPCC recognizes that: "*if droughts intensify in lowland Southeast Asia, the synergies between warmth, drought, logging, fragmentation, fire, and tree mortality, possibly exacerbated by feedbacks between deforestation, smoke, aerosols, and reduced rainfall, could greatly increase the vulnerability of fragmented forest landscapes*". Given this scenario, what will happen to the people? This is the question we would most like to address in our regional study.

Ways to Resilience: How to promote a better future

Current approaches to drought management are generally reactive and crisis-oriented, focused mostly on disaster relief, and have little emphasis on disaster preparedness. An ASEAN workshop in 2010 identified six priority gaps in drought management: 1) data availability and access; 2) monitoring capacities; 3) budget for research; 4) budget for operations; 5) knowledge sharing, and; 6) coordinated strategy. Since then, regional cooperation initiatives that can aid drought early warning systems have been introduced within ASEAN and SPC to monitor and map precipitation in their area, and provide online forecast information.

In closing, participants were reminded to give more details of their case studies on the three key questions: (i) what are the observed impacts? ; (ii) what are the future implications of climate change?; and, (iii) how to promote a better future?

Discussion

- It would be interesting to look at the implications of the droughts, not only on forests but

also on the people and agriculture. In rainfed agriculture areas, how much rainfall they receive during the rainy season matters more because this is when farmers plant their crops, compared to droughts occurring during the dry season. For forestry, however, droughts during the dry season would have serious implications such as tree loss and forest fire.

- The global map of drought occurrences shows many places that experienced frequent droughts are places where few or no people live, most probably due to lack of water. While people in these areas may already be well-adapted to dry conditions, the dynamics of land use need to be investigated more broadly as other factors may be at play. For example, distant landuse activities (e.g. cattle grazing) could further pressure marginalized communities in times of drought.
- The biggest problem we face in the climate is not only the change in weather intensity but also the increasing uncertainty of when the rainy season starts and finishes. For farmers, one month of no rainfall after sowing seeds translates to the loss of an entire cropping season. This is why when discussing droughts and people, it would be important to focus on food security and livelihoods in each country.
- The El Niño Southern Oscillation (ENSO) heavily influences the occurrence of droughts in the Asia-Pacific region. Since segregating the influence of ENSO from that of climate change on droughts is currently difficult, we need to keep nuancing our statements and also watch the nuances. IPCC's prediction of increased rainfall in Southeast Asia makes the challenge to tackle droughts even greater. Region-specific key messages are needed.

Country Presentations

With Yurdi Yasmi facilitating, participants were given 3 questions to take notes on the country presentations: what is new, what surprises you, and what are the clarifications and questions.

AUSTRALIA NEIL BYRON

Country Context

Australia has one of the most variable climates in the world. Various factors, such as the El Niño–Southern Oscillation (ENSO) and the Indian Ocean Dipole, drive this variability on a range of timescales from monthly to decadal and longer.

The key to understanding the natural distribution of vegetation across Australia, and existing land use and settlement patterns, is to understand rainfall patterns, and how they in turn depend on systematic weather patterns, particularly winds. Rainfall patterns vary greatly across Australia, ranging from high average rainfall in the Northwest to little rainfall in the Inland region. Along the east coast, rainfall is relatively uniform and predictable, but elsewhere in Australia rainfall in any year could be from one-third to 3 times the average. All aspects of climate, not just rainfall, vary from year to year. As such, drought is an inevitable part of Australia's climate variability.

Observed Impacts – loss of grazing lands, wildfires, change in food sources, migration

Periodic severe droughts are a normal part of the Australian environment, society and economy. Across the continent, almost every region, every industry and every community has at times been affected seriously by droughts. Three case study areas representing very different contexts were chosen for the study: (i) Kimberley District in north of Western Australia; (ii) Southwest of Western Australia; (iii) Wiradjuri Country of central New South Wales.

The semi-arid Kimberley District has a very sparse population of a few thousand people

working in the cattle industry and hundreds of small scattered indigenous communities practicing traditional hunting and gathering. Because the indigenous people have adapted so well to the effects of drought on natural vegetation and fauna, their response to drought is basically to change their food sources and diet. The cattle industry's response to drought is to destock grazing lands, because grass is insufficient to maintain herd numbers and animal health. While most pastoral areas in the north are burnt every 1-2 years, irregular droughts cause the growth rates of trees and shrubs to slow and the combination of higher temperature and lower rainfall greatly increases the prospects of uncontrolled fires.

The southwest part of Western Australia is covered with highly productive forests and agricultural lands. However, over the past 30 years, it has experienced more frequent and severe droughts than other parts of Australia. Urban water shortages necessitated the construction of 2 desalination plants. Severe wildfires have destroyed thousands of hectares of forests as well as some towns, villages and farms. An entire town located in a valley disappeared in 20 minutes due to bushfire exacerbated by low humidity and high wind. The Noongar people, customary owners of the southwest, have a very rich traditional knowledge of climate variability. Like most nomadic people, their typical response to extreme climates was to relocate within their vast homelands and switch to alternative food sources, although their migratory approach is now much more constrained with much denser settlement and agricultural development.

Inland New South Wales is part of Australia's agricultural heartland. The Wiradjuri are the largest Aboriginal group in New South Wales, and although most of them are now permanently settled and integrated into modern society and economy, cultural attachments to their land remain strong. All sectors in this region are adversely affected by periodic severe droughts, and so there is considerable interest in forecasts of impending ENSO events and longer-term climate change.

Future Implications

Australia is fortunate to have detailed historical records of rainfall and temperature, and very sophisticated climate modeling and forecasting, on a very fine scale. Most expert predictions are that forest and agricultural regions will experience increased temperatures and, for some, more frequent periods of very low rainfall. Exceptionally low rainfall years are projected to become more frequent in southwest Western Australia, the South Australian agricultural region, Victoria and Tasmania. Exceptionally low soil moisture is projected to become more frequent, in line with the projected increase in exceptionally low rainfall years.

The long-term impacts of projected climate change on the broader native forest estate are unclear. However, most expert opinion is that the greatest impacts will be through altered fire regimes, and changes in the incidence of pests and diseases.

If Australia's climate changes as expected, with more frequent, longer-duration, and more severe droughts in the southern half of Australia which will inevitably affect forest productivity and even ecosystem functions, then it is inevitable that many people will need to change their land uses, or change the location where they conduct their forest-based activities. Forests that remain are likely to be qualitatively different (even if covering the same spatial location and extent) and so usage patterns will almost certainly need to change.

Ways to Resilience

The greatest resilience to drought is shown where people (as households, businesses and communities) have flexible production systems based on the certainty that severe droughts will occur periodically (rather than a naive hope that they will never occur again). This attitude fosters self-reliance, preparation during the unusually good years for the inevitable drought years, the ability to relocate, to find other employment and livelihoods, and/or the buffers and reserves to be able to survive for three to five years with little or no income. Fortunately

institutions have evolved in Australia to facilitate creating such savings and reserves, through the taxation/welfare system, through social/community support networks, and through encouraging education and mobility.

To enhance resilience and community wellbeing during (and after) droughts, possible actions related to forest management include: (i) building knowledge and awareness as a means towards social and institutional preparedness; (ii) avoiding land use activities that worsen the impact of droughts, e.g. excessive clearing; (iii) building ecological / landscape connectivity and adaptation pathways e.g. through encouraging people who are there to work on vegetation management, rather than government buying the land; (iii) encouraging self-reliance rather than waiting for post-recovery aid; (iv) improvement of coping mechanisms including alternative livelihoods.

Discussion

- Australia previously tried to 'drought-proof' some areas by building reservoirs and canals. When severe droughts hit however, these were not able to supply enough water for crops and the people felt cheated. Those living inland were better prepared because they know droughts would come every 5 years. Aboriginal lands have seen an increase because former European cattle owners went bankrupt and handed the land back.
- Government has moved away from providing recovery aid when drought happens. Until 10 years ago, there was a system where farmers could claim financial assistance during "exceptional" droughts, the level for which was defined as "once in a life time" scale. It turned out that these claims were made 17 out of 18 years. So, the current policy principle is that drought is normal therefore people should be responsible for their own contingency plans. Aboriginal people have adoptive knowledge with which they have coped with droughts for 5 to 6 millennia. It would be more useful to help people move to other livelihoods, not necessarily always back to farming.

CHINA KEBIN ZHANG

Country Context

China's landscape and climate varies throughout its vast area. Northeast China has cold winters and warm summers. The east central region has more rainfall and milder winters. The southeast has a wet, subtropical climate and the west has a colder and harsher weather. Drought is normal in Northwest China. As such, the thresholds for dryness and drought are different depending on the region. This year, water level in Yellow River is very low, facing drought.

Observed Impacts – grain losses, water shortages, fires, aggravated desertification

Drought is a silent killer. It creeps in and stays without people knowing how long it will last. It leaves more serious impacts than floods or typhoons. In Southwest China, the four-year long severe drought of 2009-2012 affected 51 million people in five provinces. Impacts included decline in productivity due to crop losses, water shortages, reduced river tourism, aggravated desertification, dust storms, wild fires, and pests. Reports on forest fires were featured on national and international television. The Chinese Meteorological Administration included forest fire risk in its forecast reports. Serious economic losses from the event led central government to adjust poverty reduction policies and programs.

Future Implications

Average air temperature in dryland China has been observed to increase by 0.6°C in 40 years (1951-1991). The increasing trend of warmer and drier weather in dryland China is

aggravating desertification especially in the central latitudes. In northern China, the increasing occurrence of droughts translates to receding snow lines, decrease in river flow, shrinking of lakes, expansion of deserts and degraded lands.

Ways to Resilience

- Enhance physical infrastructure to increase drought coping capacity
- Develop a collective forest management policy involving households
- Develop national forest protection policy
- Provide subsidies for commonwealth forest management
- Enhance payments for ecosystem services (PES) policy
- Assist forest farmers to access market
- Provide more employment opportunities to reduce pressure on forests

INDONESIA YANI SEPTIANI AND TITIEK SETYAWATI

Country Context

Drought in Indonesia is becoming a "routine disaster". In 2014 alone, the National Disaster Mitigation Agency (BNPB) reported that 86 districts in 20 provinces have experienced droughts. Most frequent drought occurrences have been reported in Java, Bali and Nusa Tenggara. Droughts in Indonesia are quite well-studied. BNPB has online resources about drought forecasts and strategies for dissemination information on drought.

Observed Impacts – water scarcity, crop failures, fires, change in food sources

Four case study areas with very different characteristics were selected based on their drought history: (i) Gunung Kidul District, Yogyakarta, Java; (ii) Situbondo District, East Java; (iii) Kapuas Hulu District, West Kalimantan; and (iv) Kupang District, East Nusa Tenggara.

In Gunung Kidul, local people who rely heavily on agriculture in a largely karst environment are equipped with local wisdom to anticipate droughts and are able to communicate and coordinate on ways to cope with water scarcity and crop failures, demonstrating strong resilience. In Situbondo, staff of the Baluran National Park reported that during the drought period, animals from the savanna have wandered into the villages looking for water and tubers. They also faced fire risks from the buildup of dry litter in areas close to the park.

Fires during drought is also the greatest concern of people in Kapuas Hulu District living near Danau Sentarum National Park, as it is the cause of bad air quality which leads to acute respiratory diseases. Another notable drought impact according to local people is the reduction of non-timber forest products because these are main sources of livelihood. They observed that forest fires cause a decline in honey harvest and drop in honey quality.

In Kupang, food scarcity due to crop failure is the gravest impact of drought. As a way to cope, people eat *putak* (from boiled palm fruit stem) which is normally used to feed cattle. Putak in Indonesian society is considered a food of last resort and an indicator of dire situations.

Ways to Resilience

Strong community resilience against drought is built through long experience, culture and local wisdom. Community actions occur depending on the level of interconnectedness among its members, as well as on their knowledge, skills, and socio-economic background. Site-specific approaches are needed for managing drought impacts on forests and local communities. These approaches require good communication among stakeholders.

Discussion

- Each traditional community has its own way of knowing when drought will come. For example in Java, when grasshoppers start to sing, people start collecting water. They also look at fallen leaves and status of creeks.
- Poor people had to sell their cattle just to buy water.
- People in Kalimantan seem surprised every time an El Niño event happens because they forget the hardships as soon as it starts raining and during the period in between droughts. Government officials forget about droughts until the next event hits.
- Even though a lot of information on drought preparation is available on the website, people do not use them. How to get their interest and have a long-term perspective is a big challenge.

SAMOA FALEAFAGA LEILUA TONI TIPAMA'A

Country Context

ENSO strongly influences rainfall variability in Samoa, a small country of 2,900 sq km shared among its 180,000 population. The South Pacific Convergence Zone also influences rainfall. Climate data is relatively sparse compared to others but since droughts and floods have recently impacted Samoa's society and economy, a three-level warning system for droughts has been introduced. The Samoa Meteorology Division reported in its Climate Summary of July 2015 that this month is the driest on record, followed by July 1983, both within El Niño periods. The 2015 El Niño is projected to extend well into 2016. Sea level rise is also a major concern.

Observed Impacts – fires, water rationing

Drought periods have been recorded in 1983, 1997, 2004, and 2011, with 2004 being the worst in the record. During droughts, water is rationed throughout the country, regular reminders to conserve water come out on media, and people are warned to take notice of the fire precaution signs. Forests in northwest Savaii are particularly prone to fire risk. In Upolu island, the Aopo forests caught fire in October 2003 and Gataivai forests in 2011, with an estimated damage area exceeding 100km^2. These fires concerned those interested in *mamala (Omalanthus nutans)*, an indigenous medicinal plant found in the forest that is the subject of scientific research related to cancer and HIV/AIDS.

Future Implications

The intensity and frequency of days of extreme heat are projected (with very high confidence) to increase in Samoa although it is also projected (with low confidence) that there will be little change in the incidence of drought. The same projection applies to days of extreme rainfall. Mean sea level rise is projected to continue.

Ways to Resilience

People should be encouraged to grow drought resilient tree species and varieties of food crops with high importance to local communities. Restoration and replanting programs should also focus on using native tree species with important ecological values that can withstand the different weather conditions, heat stress or dry soil and land.

Discussion

- In Samoa, having seen that exotic species are the first ones to catch fire or be washed away by flooding, the government has been trying to stop introducing exotic species. In Indonesia, acacia trees that are highly fire-prone are everywhere.

PHILIPPINES WENDY CLAVANO

Country Context

The Philippines is in the wet tropics, with most of the country normally having a short dry season of only 3 months or less during winter. Topography and rainfall climatology are the main biophysical influences to the ecology of its remaining forests. Droughts often follow the onset of an El Niño event. For example, the peak of a drought event in northern Mindanao usually occurs 6 months on average (plus or minus 2 months) following the peak in the Oceanic Niño Index values time series. The Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) defines drought as three consecutive months of rainfall falling below 60% of the average for any given month. Dry spells are periods where rainfall is 21% below normal.

Observed Impacts – food scarcity, wildfires, health

Two case study areas were reviewed in terms of drought impacts on forests and people, one in northcentral Mindanao and the other in the Cordillera region in Luzon. Indigenous peoples live in both mountainous areas.

Spatial analysis correlating tree cover change and occurrences of droughts and dry spells in northcentral Mindanao revealed that forests were not lost due to dry spells between 1977 and 1999 during which period seven El Niño episodes have been documented. In Bendum, a sub-village out of scope of provincial public transportation, tribal elders shared that they had a much harder time during the drought in 1983 compared to that in 1997. In 1983, the land was so dry for over 3 months beginning April that food was scarce and forests were on fire. With crop failures, people went to the forest to look for alternative food sources such as root crops. The community created a fire buffer along a stream by clearing underbrush and wetting the cut material to prevent the spread of uncontrolled burning. Villagers watched day and night to fight any fire that starts. In 1998, no forest burning was observed as there was at least some rain almost every day, though not enough for their rainfed crops.

Uncontrolled fires in the pine forests of Mountain Province in Cordillera were reported as the main impact of the drought in 1993, along with impacts of the widespread haze on people's health within and beyond the province that triggered media attention. To address the problem, the local Department of Environment and Natural Resources designed the No-Fire Bonus Scheme, a form of payment for environmental services to village governments that are able to find ways to control fires in their area. The scheme was rolled out in 1996, performing villages were awarded "No-Fire Bonus Certificates" in 1997, and payments in the form infrastructure projects were claimed in 1998. The scheme was viewed to have had a carryover effect in that forest fire occurrences during the drought in 1998 was less than expected, considering the severe drought forecast at the regional level.

Future Implications

While climate forecast on annual rainfall remains the same in the region where the Philippines is part, there are projections that soil moisture in East Asia will be affected because evapotranspiration will be greater than replenishment from rainfall (or snow). Where the Asian monsoon is effective, changes in rainfall patterns can be expected, causing increases in drought frequency and severity even as average rainfall remains the same. The situation can worsen when drought occurs between April–August. Any change in ocean-atmosphere circulation affecting El Niño as well as the regional monsoon pattern will change drought characteristics in the Philippines. The uncertainty in regional changes to rainfall and temperature pose a threat not only to dry forests but to wet tropical forests as well. The effect of microclimate makes forecasting drought risk challenging. Variations in responses of the local hydrological and biological systems determine drought occurrence and therefore will be

different across even a small region.

Return periods of reference drought events in northern Mindanao have been calculated from the PDSI dataset using the base period 1890–2010. The average recurrence interval of the 1982–1983 drought event is 12 years while it is 46 years for the 1997–1998 event.

In the wet tropics, droughts are likely to affect human systems before affecting forests. When the resources of a population are stressed during drought periods, demand increases for forest ecosystem services. When drought impacts compound on other hazards, poverty being one of them, people are made much more vulnerable. Dry conditions may aggravate forest degradation, as a dry spell facilitates easier logging activities and road transport into and from the forests. Political factors, especially elections, also play a role in driving forest destruction. Next year is an election year and it is also expected to be a dry one; the combination of these will likely to lead to more tree cutting in Mindanao.

Ways to Resilience

In the Philippines in general, the closer people are to the forests, the poorer they are. In this context, building resilience against droughts should mainly come from tackling the hazard of poverty near the forests, through: (i) addressing specific needs of the poor, not only during periods of drought; (ii) decreasing dependence of people on the forest; (iii) focusing on secondary forests as a microclimate buffer zone between contiguous natural forest blocks and agricultural lands; (iv) increasing budgets for efforts that limit forest degradation; (v) recognize poverty as a hazard and use communications on hazards as a tool for development.

Discussion

- Hazard information on floods is easier to obtain than on droughts. Although more poor people are exposed to droughts than to floods, people suffer more greatly from floods.
- Clarification on reducing the dependence on the forest was requested, as it might lower the cultural value of forests to the local people, which may induce more tree cutting.
- It is helpful to work out who is doing the tree clearing, and why. This knowledge translates to extremely different approaches for tackling the issue depending on the motivation of the actors (e.g. the local communities, government, military or big businesses).
- Drought management strategies are largely relief-oriented; few actions are taken during 'ordinary times', when there is no disaster. It is often a challenge to discuss droughts or fires when it is raining outside, even though it is the best time to do so. This is exactly the wrong approach. Two years ago, Australia's national disaster management report stated that bulk of the government budget for emergencies was spent on relief and recovery, and only 5-10% was spent on disaster preparedness. Much money is wasted by not investing on mitigation measures.

BANGLADESH LASKAR RAHMAN

Country Context

Bangladesh has a tropical monsoon climate and subject to many natural disasters such as floods, cyclones, tidal surges, sea-level rise, river erosion and droughts. More emphasis has been given to flood than droughts in the country. Drought-prone areas are mainly located in the northern and northwestern parts of the country. Village forests comprise only a fraction of the land yet provide at least 70% of the total national wood demand. Around 19 million people are forest-dependent, of which 5.5 million depend on village forests.

Observed Impacts – water and food scarcity, wilting of newly planted trees

Three drought-prone sub-districts in northwestern Bangladesh were selected for case studies: Tanore, Nachole, and Niamatpur. Of the 150 households surveyed, 87% are engaged in agriculture with homestead forestry being the secondary occupation. Households have farm lands of 0.20 ha or less and homestead forests of around 0.02 ha, and earning an average of $1.7 to $2.7 per day ($629 to $1006 per year). The very poor earn less than $1/day. Income from village forests contributes between 12% and 33% of their annual income.

Over the last 50 years, Bangladesh has suffered around 20 severe droughts affecting 53% of the population and 47% of the land. Impacts on people included food scarcity due to loss of agricultural crops and livestock as well as drying out of fishing ponds and canals; water scarcity due to drying of tube wells and hand pumps as a result of the lower water table; prevalence of severe dust causing different health problems. Some people have sold timber and other belongings even at lower prices to migrate to other areas in search of employment.

Most commonly observed impacts of droughts on forests include: wilting of newly planted trees, slow growth of seedlings, leaves dropping prematurely, root death due to dehydration, and increased incidence of pests. Survey respondents also observed that large trees are more resistant to drought and that although risk of forest fires increase in natural and manmade forests, fires have seldom occurred in homestead forests.

Nursery and plantation work become more difficult during drought periods. To protect their investments in homestead forests, local people practice a variety of adaptation measures including mulching, bottle-drip irrigation and identification of drought resistant species for their village forests.

Ways to Resilience

Government agencies have responded to droughts mainly through infrastructure projects, such as through re-excavation of public ponds and canals, river dredging, as well as providing irrigation water with pre-payment system. However, these are not adequate. People are seeking non-infrastructure support such as soft loans in times of hardships, free quality climate-smart seedlings, soft cash loans during hardships, and accessible technical assistance e.g. in rainwater harvesting and improving water sources. Some initiatives have been taken to address these needs, including drought monitoring and early warning, awareness and capacity building in the face of more frequent droughts, as well as the promotion of participatory forestry, co-management of forest protected areas, and alternative income generation activities with revolving loan fund schemes.

Discussion

- Bureaucratic problems could arise when government gives out seedlings, as experienced in Australia. Government gave out seedlings for local people to plant before the anticipated drought. Local people wanted to wait until the next year and plant twice as much, but government did not have the flexibility to accommodate this approach.
- Venues for informal knowledge sharing help to spread drought adaptation practices in the community. In Bangladesh, these types of information are shared at tea occasions in the marketplace.

BHUTAN LUNGTEN NORBU

Country Context

In the small mountainous country of Bhutan, 72% of the land is under forest cover of which 51% is set aside as biological corridors and protected areas where people are allowed to reside. Bhutan has three distinctive forest types attributed to its varied altitudes: (i) southern

sub-tropical forests (200-1,000 masl) in the southern part, temperate forests in the inner valleys of the central part (1,000-4,000 masl), and alpine forests (>4,000 masl) in the north. Economy is largely agrarian with 69% of the population directly dependent on natural resources. Traditional use of plants is embedded in the culture and plays an important role in livelihoods. With modern development, hydro-power production and tourism industries are increasing, exerting pressures on forest, land and water resources.

In recent years, droughts have been reported across many districts with the hardest hit being Wangdue in western Bhutan, Trashigang and Lhuntse in eastern Bhutan and Sarpang in southern Bhutan.

Observed Impacts – water scarcity, crop losses, pests

Two districts were selected as case study areas: Wangdue (warm temperate) and Sarpang (humid sub-tropical). Since limited documentation is available on the impacts of drought on forests and peoples' livelihoods in Bhutan, the study was based on analysis of weather data from 1996-2009, and validated with people's perceptions through structured interviews in Wangdue and focused group discussions in Sarpang.

In Wangdue, temperature and precipitation data implied a warming trend from 1996 to 2009, with some years receiving erratic and considerably less rainfall. Most respondents (75%) perceive an increase in annual temperatures and wind storms. In terms of rainfall, 30% of respondents perceive a decreasing trend, 60% think it is increasing and only 10% think that the trend has not changed. Thirty percent of respondents felt that droughts and flashfloods have become more frequent, but 50% considered these to be rare occurrences.

In Sarpang, maximum and minimum temperatures showed a decreasing trend during the study period, with erratic rainfall. People's general perception is that over the years, temperature has increased, rainfall has decreased and droughts have become more common with the most recent being 2013. More frequent occurrence of flashfloods has also been noted. Most respondents reported an increase in incidences of pests and disease but there were a few who thought otherwise.

In both study sites, all said that droughts have negatively affected their water sources for drinking and irrigation as well as their agricultural crop production (rice, maize, wheat), though many were unsure whether droughts have adversely affected forests and trees. Perceptions on the relation between forest fire trends and droughts were generally mixed.

Future Implications

In alpine forests, several species with medicinal value are sensitive to temperature changes and their numbers may decline with climate change. An example is the *cordyceps*, an insect parasite fungus with high export value and on which highlanders depend heavily for their livelihood. Rice blast is already becoming a significant problem and compounded with climate change, subsistence farmers are likely to face further crop losses.

Ways to Resilience

Most respondents felt that protecting forests and trees around villages, managing community forests, and proper land use management to improve and conserve forests, land and water can offset ill-impacts of droughts on agriculture production and ecosystem services.

Building resilience of forests and trees through adaptive forest management options and practices and community awareness are important to enhancing the role of forests and trees in buffering the negative impacts of droughts and climate change. Approaches include: (i) maintaining healthy forest ecosystems for resilience; (ii) restoring degraded forests; (iii) instituting PES for Community Forestry; (iv) sustainable management of biodiversity and

non-wood forest products (NWFP); and, (v) better understanding of relationships between forest and water at the watershed scale.

Discussion

- The dataset used for this study only spans 20 years. Recognizing that a minimum of 30 years data is needed to establish observed trends as due to climate change, the study tapped people's perception surveys to validate trends and impacts on the ground.
- FAO promoted climate-smart agriculture in Bhutan and detailed information is readily available online.

INDIA PROMODE KANT

Country Context

India receives the highest average annual rainfall in the world yet 69% of its land is dry (arid, semi-arid and sub-humid). Almost half (44%) of the country's 328 million hectares are degraded due to water erosion, soil acidity, water logging, wind erosion and salinity. Drought occurrence is epochal; many droughts documented over 110 years between 1877 and 1987 resulted in widespread famine.

A comparison of drought occurrences between two 20-year periods (1951-1970 and 1991-2010) indicates that patterns in drought frequency and duration are shifting away from Rajasthan, Gujarat, Orissa, and Bengal's east coast, to central and eastern Uttar Pradesh, northern Madhya Pradesh, northern Punjab and Haryana, northern Maharashtra, and Gujarat.

Observed Impacts

The nomadic pastoral Raika community is used to the dry conditions of western Rajasthan. People have traditional knowledge of animal husbandry and natural resource management based on seasonal migration. However, with recent wetter climate, their migration is now much restricted due to: (i) unavailability of common grazing lands and fodder grasses in the migration areas; (ii) restrictions from the farmers and joint forest management committees; (iii) availability of enough grass and tree fodder without migrating to different area due to increased rainfall; and (iv) availability of social services such as education, health services for family members and their livestock that they can benefit by staying in one place.

Impact of droughts on forests is usually decreased vegetation activity and plant growth but in dry lands, plant mortality or long-term damage is relatively less compared to humid biomes because plants in dry areas have evolved varying mechanisms to adapt to water shortages.

Future Implications

The geographical shift in total drought duration, frequency and severity across India coincides with a range of IPCC observed changes in climatic events attributed to increased greenhouse gas emissions. IPCC models projected more rainfall in India due to climate change. Many parts of India however have seen the opposite trend of less rainfall so far. Arid areas are also increasing.

Ways to Resilience

The Ministry of Agriculture produced a Drought Management Manual containing guidelines for tracking, declaring and mitigating droughts, and for providing relief. It also outlines the responsibility of forest departments in supporting local people during drought periods and in conducting afforestation as a way to mitigate droughts. Better partnership between state forest department and village communities, tribal institutions, and joint forest management committees is crucial for planning and implementation of drought measures. In dealing with water scarcity, the government should consider ground water recharging as one of the most

important tasks.

Discussion

- The Manual on Drought Management is interesting and very appropriate for this study. More elaboration on this would be very useful to have in the country report.
- The case study is more about increased rainfall rather than drought.
- The concern about upstream-downstream tradeoffs in rainwater harvesting (a bucket of rainwater harvested in upstream is a loss for the others downstream) may not apply in this case because the population is scattered.

Wrap-up of Day 1 PEDRO WALPOLE

A list of seven items discussed during the day was laid out to ponder and provoke participants to think about related issues.

1. Vulnerability and resilience

- If people are vulnerable, they are not resilient. Disaster resilience is only limited to bringing them back to where they were, until they are knocked out again. So, it is important to look at people's vulnerability when there is no disaster, then in relation to resilience and vice versa.
- Social changes make some people more vulnerable and some less vulnerable. Who are made vulnerable is crucial because often they are lost on record.
- Food security, livelihoods, and jobs are all connected. Talking about forestry sector is talking about jobs. Working these out is important.

2. Re-prioritizing risks

- While a greater number of people may be affected by droughts compared to floods, people tend to be affected in a greater degree by floods. It is important to look at how drought and its risks might be re-prioritized in a local context.

3. Education for sustainable development and reviewing climate models

- SDG 7 discusses about forests. Sustainable forest management needs to be brought into the local context, and connected to a long-term process education process. Tools such as the SFM toolbox and the Manual for Drought Management could help this process.
- Better understanding of drought in connection with the current science, most notably IPCC models and other prediction studies is crucial.

4. Disaster risk reduction and management

- Drought is pointed out as a silent killer during today's discussion. Current management response to drought has parallels in the example of the frog in boiling water. A frog thrown into boiling water jumps out, but if the frog is already in water which only slowly warms up, the frog will just sit there until it eventually pops.
- Disaster risk reduction should not be limited only to relief efforts; it is only a part of the big picture.

5. Government and community system awareness

- A lot of observations were made on how communities are coping and adapting during times of drought. A lot of recommendations included promoting better awareness on government programs, policies and systems to tackle droughts, and how community practices can shift to be prepared in addressing drought impacts.

6. Water access responses

- One of the larger areas of adaptation is water access responses. We need to carefully examine whether these responses are really helping us become more sustainable? If these responses are just getting people through the crisis but leading into further problems in the near future, then resilience is not viable.
- Adaptive forest management appeared many times in today's recommendations. There is a need to closely examine adaptive forest management in each context as when planting trees, significant water loss from the total available water is imminent.

7. Agriculture responses

- Responses to droughts from the agriculture and agro-forestry sector need to be focused. The finding that Indian government has assigned the forestry department the role of providing fodder for livestock during drought came as a surprise. This may illustrate how much of the forest is actually savanna or grassland which is increasingly the case for many countries. More of these findings are encouraged.

Discussion

- It is surprising that agro-forestry did not figure strongly in the presentations today. Trees that produce food for people and animals such as fruit bearing trees or fodder would likely be the choice of the local people.
- Responses to drought still tend to be reactive rather than proactive. What efforts are needed to ensure better preparedness? We all know prevention is better than cure yet it is almost impossible to get government to allocate money before a disaster. It is also difficult for them to stop throwing money after a disaster. Economy booms after a disaster. Philippines recently agreed to allocating 15% of the disaster management budget for disaster preparedness and early warning.
- What happens when some official announces a drought determines what evidence is needed and who decides. In Australia, this red flag would have no consequence. In the Philippines, a red flag for floods now leads to much clearer strategies to address the hazard. In the US, a state's declaration of drought unlocks channels of support from government agencies such as USDA to help local farmers get through the crisis.
- If we are expecting El Niño, guidance from agriculture departments on which appropriate crop to plant in light of the severity and length of the predicted drought would be very helpful. There is already enough information about forecasting drought but limited information to connect these forecasts in the light of crop planting schedules.
- It would be good to explore gender elements in a drought context, for example, how are women impacted and how do they respond to drought?

Day 2

Discussion 1: Capturing commonalities, differences and lessons

Participants divided into three small groups[2] to discuss commonalities, differences and lessons that each observed from the country presentations and discussions on Day 1.

COMMONALITIES

This section captures participants' observations on what are the common findings, lessons and recommendations across countries in the region.

[2] Group 1 - Australia, India, China; Group 2 - Indonesia, Samoa, Philippines; Group 3 - Bangladesh, Bhutan, Indonesia.

Lesson <u>not</u> yet learned: Prevention is better than cure.
While governments know the impacts of droughts on water, crops, forests, and then to people's livelihood and health, in most countries droughts were addressed nearly always as a "surprise" natural disaster. Investment in drought preparedness and early warning is very low compared to the amount of money spent for relief and recovery after drought events.

Weak focus on vulnerability
Since response to droughts is commonly centered on relief efforts, little attention tends to be given to identifying the most vulnerable segments of society so that their resilience to droughts may be built.

Gaps in linking drought forecasts with early warning systems
The links between monitoring, forecasting and early warning systems are not adequate, and assessments on socio-economic impacts of droughts on food security and livelihoods are limited.

Inadequate communications
Communicating information on drought monitoring, forecasting and early warning is not effective across sectors and levels, especially in reaching local communities. Drought strategies tend to be weak in incorporating local wisdom and knowledge and self-help initiatives.

DIFFERENCES
In this section, participants explore key differences in contexts and approaches to droughts.

In predicted effects of climate change
Some regions are predicted to become wetter, some drier.

In adaptation capacities of ecosystems and people to droughts
Impacts of droughts tend to be more severe on people and ecosystems that are used to wet conditions, compared to those that are used to dry conditions, because the latter have already evolved adaptative capacities and tend to have a greater degree of preparedness.

In prioritizing actions to address drought risks
In areas and countries where drought is considered a natural variability, such as in Australia, the responsibility for addressing drought risks rests largely with individuals and local communities. In other countries, considerable government support flows to areas where drought is declared. The priority ranking of and budget commitment to addressing drought as a hazard tend to be lower in countries that encounter other fast-onset hazards that have graver effects on people.

In the time frame and type of responses to drought impacts
Some governments are focused on short-term responses, others have long-term approaches. Some go for drought proofing through hard technologies, others use soft technologies.

In government decision-making protocols and implementation capacities
The level of government authority that decides on when to declare drought and address its impacts depends on the variability of ecological context within the country. Large countries with extensive natural variability tend to devolve the decision on when to issue a drought emergency to the sub-national or local level. The availability of government resources and the capacity to respond to the given threat also differ across case studies.

In community approaches to identifying and addressing drought impacts
Communities featured in the case studies have varying levels of resilience against droughts. Some have greater local knowledge and greater means to cope and adapt than others.

SURPRISES
This section captures what surprised participants in specific country presentations and issues across the countries as well as the coverage of the case studies.

In Contexts
- A hundred years after the ENSO phenomenon was uncovered, affected countries are still caught by surprise every time it recurs! Why have we not improved in anticipating and preparing for El Niño, even though it is a fairly predictable phenomenon?
- Australia accepts that there is always the possibility of drought, and that this has translated to reduction in government support for example in livestock farming.

In Impacts
- Drought is not a new issue, tools for mitigating is available, however impacts remains (has not been reduced), hence negative impacts tend to become large
- Another negative impact of drought could be on water transportation and tourism, as in the waterfalls in China.

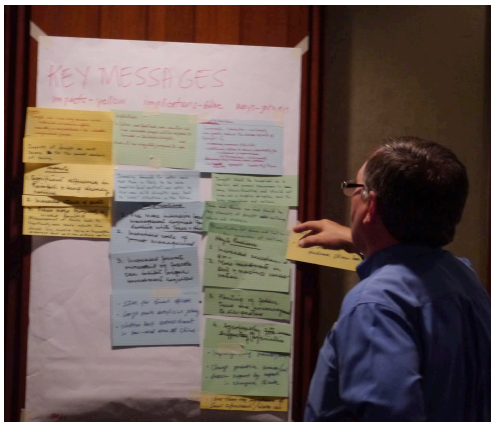
In Future Implications
- Some of the observed impacts on the ground and country level studies tell a different story from some of the IPCC projected scenarios for the region.
- The potential of conflicts triggered by drought was not taken up in any of the discussions.
- Science is improving but rarely used in full. While detailed, high resolution, finer scale climate forecasts are readily available, these are not yet connected with socio-economic data at the same scale.

In Approaches to Resilience
- There was limited focus on agroforestry as a “forest-related” resilience strategy in the country reports.
- The trade-offs when using trees to mitigate droughts were not very well discussed. There was limited recognition that planting trees can exacerbate the impacts of drought in some situations. It was surprising to know that there are people who plant and water trees during drought.
- There was little mention of efforts to discourage planting exotic species.
- Only a few cases featured communities acting together or following a cohesive action.
- Relocation can viewed in both negative and positive lights. When done by choice as in the Australian context, ability to relocate is positive. When externally forced, then internal displacement is negative.
- Drought monitoring and forecasting techniques are in place in all countries.
- The smartest responses to climate threats may be social or institutional, not biophysical or engineering.

Discussion 2: Crafting key messages and recommendations

Based on the first discussion, each group was tasked to craft key messages and recommendations with identified target audiences where applicable.

KEY MESSAGES



- Droughts can cause significant loss of livelihoods especially to the poor who have little or no capacity and resources to respond.
- Droughts can cause severe and incremental damages to forests and trees.
- The roles and limitations of forests and trees in mitigating drought impacts are less understood and appreciated.
- Resilience to drought will have to be enhanced. Such resilience can be built through e.g. awareness raising, development of appropriate policy and legislation, scaling up of mitigation methods and integrating local/traditional knowledge.
- Droughts require long-term planning and need to be tackled not only in the agricultural lowlands but also in the forest and the uplands.
- Addressing and adapting to drought require a holistic approach that goes beyond a "forest-centric" approach involving relevant sectors and actors.
- Impacts of drought are site-specific and thus responses and mitigation measures cannot be uniformly applied.
- Always expect surprises from drought events as climate change and predictions are still based on limited data and information.

RECOMMENDATIONS

To national governments

- Develop a national communication strategy and program to raise awareness of the impacts of drought on forests and people;
- Strengthen countries' polices and legislation to ensure effective responses to droughts coupled with strategic capacity building for relevant actors across levels and sectors.

To national, regional and local governments

- Develop mechanisms for local people to effectively deal with droughts incorporating their local knowledge and wisdom, and explore alternative livelihoods with less direct dependence on forest products;
- Promote sustainable land use practices to avoid severe impacts of drought.

To households and local communities

- Strengthen local collaborative coping and adaptation mechanisms and local drought planning processes;
- Discuss how to respond if severe, extended drought occurs and prepare drought contingency plans.

To research sector

- Intensify research and scientific investigation and communicate the results to inform policy decisions and practical actions;
- Provide information not only during the period of rainfall deficit but also even during the start of rainy season.

Feedback Sessions for Finalizing Country Reports

One-on-one feedback sessions between a country report author and a reviewer were held in the afternoon of Day 2. Reviewers[3] used a common framework to prepare comments on the first drafts assigned to them, which served as their starting point for the one-on-one discussions. Appendix 4 (in a separate file) provides the peer review and feedback checklists.

Overall, feedback sessions were found to be productive. By the afternoon of the Day 2 when this was scheduled as the last session of the workshop, all the country authors had acquired a better understanding of the people-oriented objectives and aims of this forests and droughts study. The one-on-one approach of going over the draft reports offered an opportunity for to both reviewer and author to clarify points for improvement on both content and format.

Wrap-up Day 2 KUMIKO KUBO AND PEDRO WALPOLE

The wrap-up included a reminder from Kumi about next steps, targets and deadlines for wrapping up the regional assessment. In recapping the 2-day workshop, Pedro expressed how much he valued the discussions with participants. With six more weeks to wrap up the studies, he recapped how the workshop discussions might influence the finalization of the country reports.

The presentations generally focused on climate, forests and people. During the course of our sessions, we realized the need to rework the levels of emphasis across these three topics, to highlight the people aspect of the study. This may necessitate a slightly different approach from how the papers are currently presented:

- *Climate change*: We need not discuss climate change in detail in the paper, though important to reference and understand the data relevant to the context of the study.
- *Forest:* Many of us have seen forest degradation over time in the context. Response to drought is our long-term payback to environmental degradation.
- *People:* We only started to talk about people when we started discussing area-specific information, although we only talked of the poor indirectly. In many places, the economically marginalized is also the socially marginalized. The need to ensure that adaptive strategies will reduce vulnerability and strengthen people's resilience figured strongly in the group discussions.

One of the misconceptions of resilience is that bringing people back to where they were before the event would be sufficient – until they are knocked down again by the same natural disaster. Bringing them a step further away from risk is the resilience – people must be in a better position to face future risks. Since we agree that drought is a creeping disaster that can contribute to social paralysis, we need to evaluate the effectiveness of responses in helping people get to a better position even before facing droughts. We stressed the importance of prioritizing policies and actions that are preemptive and adaptive rather than reactive.

Communities are commonly not united. Communities in remote areas – indigenous and tribal

[3] Peer reviewers: Patrick Durst, Kumiko Kubo, Kenichi Shono, Rowena Soriaga, Pedro Walpole, and Yurdi Yasmi.

groups – are often 'communities of practice' as they tend to work in the same way. In areas located nearer the market, communities tend to become more economic-centered, and this is often where discussion of exploitation and conflicts tend to come in. Part of the responsibility of those who geographically live together is to learn to work together, to share some of the same good practices. In refining the case studies, it would be good to expound on the quality of the community context and its interconnections with policy, and edit out those that do not fit your key messages. It is also fundamental that short-term recommendations match long-term ones.

Closing Remarks PAT DURST

Pat ended the workshop with an expression of how much fun he had given the size of the group and the process. He recognized that time for these exercises are valuable and hard to come by and wished that participants had the same positive experience.

Many discussions on policy implications took place during this workshop. Specific topics such as tree species and growth rates that foresters normally talk about tend not to go very far beyond the forestry community. An effort like this can have the most impact when it gets into the policy arena, when it talks about trade-offs and informs decisions of politicians or those with different agendas, when it guide things in a positive way.

What took place in this workshop is reminiscent of discussions that take place in the Asia Pacific Forest Policy Think Tank as it tackles specific issues, draws people to longer-term efforts, and determines how best we can influence the policy. It would be good incorporate this topic in the Think Tank process. This size of a workshop is a fun size, because it gives people opportunities to get to know newcomers, go into deep discussions, and get as direct as needed. Gratitude was expressed to all for the commitment to this study and coming to Bangkok for the workshop.