Restoring Coastal Livelihoods: “Increasing the Resilience of Mangrove-Aquaculture Socio-Economic-Ecological Systems in Southeast Asia”
BACKGROUND OF THE ISSUES

The Indonesian archipelago, that latitudinally lies between 11°S and 6°N, and between 95°E and 141°E in longitude, has a coast line of more than 55,000 km, is home of around 3.1 million hectares (Mha) mangrove forests, which is almost a quarter of global mangrove areas (Giri et al., 2011). These mangrove systems are distributed across the archipelago that dominates the Indo-malesia ecoregion where more than 20 genera and 50 species of mangroves are found (Spalding et al., 1997; Duke et al., 1998; Alongi, 2002). Indonesia has lost more than 1.2 Mha of its mangroves since its mangrove forest cover was still 4.2 Mha in 1980 (FAO, 2007). Amongst the immediate impacts of mangrove loss is the decline in fish production, since mangroves are vital fish nurseries and rapid erosion in the absence of buffer against high waves. 60% of this loss has been attributed to conversion of mangroves to brackish water aquaculture ponds, which peaked in the 1980’s and 1990’s during a period of aquaculture expansion known as the blue revolution. (Stonich, 2000) Although the blue revolution touted benefits such as job creation and increased protein for Indonesia’s coastal communities, the focus on industrial shrimp production to increase foreign currency exchange, and the reliance on use of external industrial inputs has severely decreased the ecological health of near-shore coastal systems and resultantly the livelihoods of coastal communities.

Of these affected coastal communities, rural, poor populations are most negatively affected by loss of mangroves and privatization of coastal lands, with women bearing the largest burden of all (Melati, 2013; Siregar, 2012).

Although a National Strategy has been created by the Ministry of Forestry for mangrove protection and sustainable utilization, the Ministry of Fisheries purport strategies which would allow for continued aquaculture expansion from the current coverage (660,000 ha) to more than 2.9 million hectares, begging the question, where would this additional 2.24 million hectares of ponds be developed? (Armandhanu, 2012) Although a multi-stakeholder national mangrove working group has been convened, issues of aquaculture expansion have not been explicitly discussed within the forum.

In lieu of this discussion, aquaculture proponents are increasingly looking to aquaculture certification programs to improve current management and production, which would ostensibly reduce the need for continued expansion, however, these certification
programs have met with scrutiny and staunch resistance worldwide. (Intrafish, 2013)

The drivers of aquaculture expansion are numerous (economic policy, global market demand, lack of adequate national spatial planning, etc.) but expansion also occurs as migrant Bugis and Makassarese populations, emanating from Southern Sulawesi, act as willing participants in opening new tambak areas, due to entrenched social conditions (feudal relationships, cultural identity) and degraded coastal ecosystems in their own province. (Boesma et al, 2012; Fougeres, 2007; Sano, 2000)

Mangroves are amongst the most carbon-richest forest types in the tropics after peat swamp forests, containing on average 1023 tonnes of carbon per hectare (Donato et al. 2011). Most of this total (49–98%) is stored below-ground in organic-rich soils. Deforesting mangroves and excavating carbon-rich soils triggers large amount of carbon emissions into the atmosphere. Globally it has been estimated that mangrove deforestation generates emissions of 20–120 million tonnes of carbon per year. Based on the land cover map produced by the Ministry of Forestry (2011), during 2000-2009 the annual rate of mangrove deforestation in Indonesia was 22,000 hectares per year. Such a rate would cause annual carbon emissions of 23 million tonnes. Deforestation also leads to subsidence of near-shore systems, exacerbating the effects of sea-level rise, leading to issues such as “Coastal Squeeze,” currently exhibited along the Northern coast of Java.

**CURRENT INITIATIVES**

The Restoring Coastal Livelihoods (RCL) project in South Sulawesi has been working to identify and reverse roots causes of continued degradation in the intertidal system, to provide examples if scalable, improved management and potentially reduce a driver of continued aquaculture expansion in other regions.

Through RCL, *Ecological Mangrove Rehabilitation* (Lewis, 1997, 2000, 2005) has been demonstrated in 395,28 ha of disused aquaculture ponds on Tanakeke Island, providing and effective, low-cost solution to reforestation and an improvement over common mangrove planting programs. Over seventy (70) *Coastal Field Schools* have built the capacity of regional aqua-culture and agriculture extensionists, who work in concert with coastal communities to analyze agro-ecosystems and reduce the use of external inputs in food production systems; resulting in improved
yields, increased incomes and savings, and improved environmental health. This approach is being applied to forestry management, through development of Forest Management Learning Groups, building communities’ capacities to become involved in forest and coastal resource management. Mangrove Working Groups (KKMD) are being formed at the district and provincial level, providing a formal body to continue learning by doing, synthesis different knowledge systems, access and share government budgets and ensure management flexibility, a process known as Adaptive Collaborative Management.

Numerous groups have been working on similar programs across Indonesia in a variety of systems where mangroves and aquaculture are major landscape features. Some have experienced large-scale conversion and are severely degraded, such as Semarang in Central Java, Lampung and the Mahakam Delta in Kalimantan. Other areas, such as the Kapuas Delta in West Kalimantan, Tanjung Panjang in Gorontalo and Northern Luwu in South Sulawesi are experiencing current large-scale degradation and conversion. Then there is Papua, which contains half of Indonesia’s remaining mangroves, and presents good examples of both silviculture as well as vast pristine mangrove forests exhibiting the highest levels of primary productivity for any mangrove forests worldwide. (Donato et al., 2011). Case studies from RCL and around Indonesia will be presented during parallel sessions, to better understand the strengths, weaknesses, opportunities and threats from these various social-ecological systems.

THE CONFERENCE’S FLOW

Day One
Three Keynote presentations will provide a historical sketch of a pair of major Indonesian landscapes which have undergone degradation at the hands of unregulated aquaculture development. Presenters will be asked to consider the social, economic and ecological resilience of these focal systems, and provide recommendations for future restoration and management.

A total of nine Thematic Sessions will be run in Parallel on days one and two of the workshop. Themes for these sessions were selected through a consultative process, allowing for major components of mangrove and aquaculture systems to be discussed from a variety of perspectives including; social, political, cultural, economic valuation, development, livelihoods,
ecological and restorative. Three presenters will be selected for each session, totaling 27 presentations. Presenters will graphically describe their focal system, after which audience members will break into small groups to analyze the presentations using a resilience lens. The resilience lens involves looking at the relative strengths, weaknesses, opportunities and threats (SWOT) of social, cultural, policy, economic and ecological aspects of the presentations. Facilitators will be on hand to help focus this small group work, which will be presented back to the group at large as a means of sparking discussion.

Information from the analysis of the presentations will be recalled again on day three, where participants will be asked to develop models and scenarios for resilience building in various mangrove-aquaculture social-ecological systems.

**Day Two**

One *Highlight* of the Seminar will be a *Talk Show* on Day Two, where Prita Laura of MetroTV will host a trio of guests to discuss the macro policies and practices behind mangrove degradation and aquaculture expansion, as well as the effects of lives of livelihoods of Indonesian communities. Dr. Hilman Nugroho, Director General of Watersheds and Social Forestry will be invited, to discuss the Indonesian National Mangrove Strategy including National and Regional Working Groups, and also the newly formed ASEAN Mangrove Network (AMNET). Slamet, Soebjakto, Director General of Aquaculture will be asked about the Ministry of Fisheries policy towards aquaculture expansion, and the frequently understated role of mangroves as natural capital driving near shore fisheries. Aloysius Suratin, Deputy Country Director of OXFAM will also join the Talk Show, with the task of discussing how degraded coastal ecosystems further marginalize coastal people, especially women, and how policies and strategies can be shaped to reverse the trends of degradation and poverty.

Before lunch on Day Two, groups from across Indonesia will have an opportunity to present hands-on demonstrations of technical mangrove-aquaculture management ranging from Environmental Education, Non-timber forest product use, organic aquaculture, climate change research, and ecological mangrove rehabilitation. Demonstrators are urged to contact the seminar committee to arrange hands-on demonstrations sessions for up to 35 participants. Day Two will also continue with facilitated Parallel Sessions.
**Day Three**

With the background of Global Climate Change and Sea Level Rise – Indonesia’s expansive coastal zone and the communities that live there are at high risk of continued ecosystem degradation and resultant poverty. Day Three of the Workshop will be dedicated to providing a deeper understanding of Adaptive Capacity and Resilience Theory, in order to provide participants with skills, knowledge and understanding of managing complex, dynamic systems. This will begin with a presentation to all participants on Adaptive Capacity and Resilience Theory.

Adaptive capacity in ecological systems is related to genetic diversity, biological diversity, and the heterogeneity of landscape mosaics (Carpenter et al. 2001a; Peterson et al. 1998; Bengtsson et al. 2002). Ecologists from the region have recommended between a 4:1 ratio of mangroves to aquaculture ponds (Saenger et al., 1983, Primavera and Esteban 2008, Samson and Rollon, 2011) to 6:9:1 or even 22:1 ratio (Primavera et al., 2007) to ensure the delivery of a full range of ecosystem services, with ponds located in the upper intertidal, to guarantee filtration functions, coastal protection and high functional fisheries values. Noss, cautions that there is no magic number, and along with Pittman state that the only defensible targets are those derived from empirical data and rigorous analyses, which will need to be undertaken at a site specific level. (Noss et Al. 2012, Pittman et al., 2004) Ph.D. Jim Davie states, “The question about how much mangrove/wetland should be retained is actually the wrong ques- tion in that it infers that the alternative use is clearly better/more economically valuable - and that there is an answer anyway. The alternative question is ‘how much mangrove/wetland can we retain and still achieve a sustainable return on investment?’ a question which implies that the mangrove forests have something to offer the investment through ecological/environmental services - and its other multiple uses.” (Davie, 2013, personal communication).

In social systems, the existence of institutions and networks that learn and store knowledge and experience, create flexibility in problem solving and balance power among interest groups play an important role in adaptive capacity (Scheffer et al. 2000, Berkes et al. 2002).

Systems with high adaptive capacity are able to re-configure themselves without significant declines in crucial functions in rela- tion to primary productivity, hydrological cycles, social relations and economic
prosperity. A consequence of a loss of resilience, and therefore of adaptive capacity, is loss of opportunity, constrained options during periods of re-organisation and renewal, an inability of the system to do different things. And the effect of this is for the social-ecological system to emerge from such a period along an undesirable trajectory.

Resilience Is Key To Enhancing Adaptive Capacity.

Are there elements that sustain adaptive capacity of social-ecological systems in a world that is constantly changing? Addressing how people respond to periods of change, how society reorganizes following change, is the most neglected and the least understood aspect in conventional resource management and science (Gunderson and Holling 2002). Folke et al. (2002) identify and expand on four critical factors that interact across temporal and spatial scales and that seem to be required for dealing with natural resource dynamics during periods of change and reorganization:

- learning to live with change and uncertainty;
- nurturing diversity for resilience;
- combining different types of knowledge for learning; and
- creating opportunity for self-organization towards social-ecological sustainability.

A pair of presenters will relay the concepts of resilience and adaptive capacity, closing with explanations of a pair of activities that can be undertaken by multi-stakeholder groups in planning for the future: modeling and scenario development. Afterwards, the seminar participants will break again into small groups, to investigate a trio of landscape types which represent the current status of Indonesia's mangrove forests:

1. Full-scale Historical Conversion: South Sulawesi, Lampung, Mahakam Delta, North Central Java
3. Pristine Mangroves: Mimika-Asmat

Case studies and analysis from the parallel sessions on Day One and Day Two will be recalled in this final analysis. During these final breakout sessions, groups will be facilitated to look at the above landscapes from a resilience perspective, and be asked to either create a model of system dynamics or provide a set of future scenarios of mangrove management options.
These models and scenarios will be presented back to the group at large. *Synthesis*, at the end of the workshop, will take the form of recommendations to be considered in potentially revising the national mangrove strategy (SNPEM), and considerations to be made as the national mangrove strategy is adapted in various provinces and districts by mangrove working groups (KKMD).

The **Objectives** of the Seminar are:

- To analyze the drivers of mangrove conversion to aquaculture, and the impacts on coastal communities and ecosystems.
- To share experiences related to mangrove restoration, aquaculture extension and improved management, and approaches to sustainable livelihood alternatives in degraded areas.
- To identify constraints to and options for sustainable management.
- To engage participants to develop Models and Scenarios taking into consideration principles of Adaptive Capacity and Resilience.
- To provide recommendations to the National Mangrove Strategy (SNPEM) at National and Sub-National levels.
Participants - **Women and Men** - Including;

Practitioners from **coastal communities** in mangrove areas, both degraded and in tact.

**Government** staff from local, national and regional agencies related to socio-economic or environmental management in coastal areas.

**Academicians** from Indonesian and International Universities with experience in multi-disciplinary studies around coastal issues.

**NGO** workers with experience in action-research/problem solving, mangrove rehabilitation, and sustainable livelihood development.

Members of the **business** community with experience in social-entrepreneurship in coastal areas.

**Registration and Costs:**

Registrants for this training will need to complete the attached application form, and return it at the earliest possible convenience to the conference secretariat. Equal participation by women will be ensured.

Travel, accommodation and participation costs will be covered by the seminar secretariat for all presenters and select participants.

**Conference Secretariat:**

For more information and questions, please contact: MAP Indonesia Secretariat: +62 411 457174 or MAP Project Director - Ratna Fadillah: 081340491149 E-mail: racheave@yahoo.com
the eve before: Opening
17 February 2014
16:30 – 18:00  • Welcome from CIFOR
  • Welcome from Restoring Coastal Livelihoods
18:00 – 18:30  Sholat Maghrib
19:00 – 20:00  Dinner & Film

day 1: Setting the Scene
18 February 2014
8:00 – 8:45  Registration
8:45 – 9:00  Conference Introduction
9:00 - 9:30  Keynote Speech #1: Ibu Cherryta – Ministry of Forestry/PHKA
  The Road Map for Restoration and Sustainable Livelihood Alternatives in Cagar Alam Tanjung Panjang
9:30 – 9:45  Tea/Coffee
10:00 – 10:30  Keynote Speech #2: Roel Boesma – University of Wageningen
  Challenges of a Transition to a Sustainably Managed Shrimp Culture Agro-Ecosystem In The Mahakam Delta, East Kalimantan
10:30 – 11:00  Keynote Speech #3: Daniel Murdiyarso – CIFOR
  • Vulnerability of Mangrove Ecosystems
  • Importance of Adaptation Strategies
11:00 – 12:30  Parallel Sessions First Round (max 2 presenters)
  • Towards a More Sustainable Aquaculture
  • Current Intertidal Policies
  • Drivers of Mangrove Habitat Degradation
  Presentations followed by facilitated small group discussions and feedback
12:30 – 13:45  Lunch
14:00 – 16:30  Parallel Sessions Second Round (max 3 presenters each)
  • Mangrove Rehabilitation Strategies/Practice
  • Climate Change & Sea Level Rise - Mitiation and Adatation
  • Mangrove Valuation
  Presentations followed by facilitated small group discussions and feedback
19:00 – 20:00  Poolside BBQ - CIFOR
day 2: Finding Ways Forward
19 February 2014
9:00 - 10:30 Talk Show
Finding Common Ground in the Intertidal Region
Facilitated by Prita Laura - Metro TV
- Director General of Aquaculture – Dr. Slamet Subiakto
- Director General of Watersheds and Social Forests - Dr. Hilman Nugroho
- Restoring Coastal Livelihoods Project

10:30-11:00 Tea/Coffee

11:00 – 12:30 Technical Demonstrations
- Environmental Education
- Cooking with Mangrove
- Mangrove Batik Making
- Using Google Earth for Mangrove Management

12:30 - 14:00 Lunch

14:00 – 16:30 Parallel Sessions Third Round (max 3 present)
- Good or Recommended Mangrove Management
- Sustainable Coastal/Intertidal Livelihoods (non aquaculture)

19:00 – 20:00 Dinner

day 3: Scenarios, Strategies and Synthesis
20 February 2014
9:00 - 9:40 Adaptive Capacity & Resilience Thinking
Presenter

9:40 – 10:20 Modelling & Scenario Building
Presenter

10:20 – 10:40 Tea/Coffee

10:40 - 12:30 Breakout Working Groups
Applying Resilience Framework to Mangrove-Aquaculture Social-Ecological Systems

12:30 – 14:00 Lunch

14:00 – 15:30 Presentations
Applying Resilience Framework to Mangrove/Aquaculture Social-Ecological Systems

15:30 – 15:45 Tea/Coffee

15:45 – 17:00 Synthesis/Recommendations/ Evaluation/Closing Ceremony
thematic sessions:

ROUND ONE
Theme A: Towards a More Sustainable Aquaculture
- Current productivity and coverage
- Progressive extension methods
- Certification efforts
- Scaling-up productivity

Theme B: Mangrove Rehabilitation Strategies/Practices
- Current practices and reflection
- Ecological Mangrove Rehabilitation

Theme C: Drivers of Mangrove Habitat Degradation
- Current status/condition of Mangroves (Indonesia/ASEAN)
- Aquaculture development
- Climate change + Sea Level Rise
- Coastal squeeze

ROUND TWO
Theme D: Mangrove Valuation
- Utilization
- Ecosystems Services

- Intrinsic
- Options Value

Theme E: Current Intertidal Policies
- Global/regional policy
- National + sub-national
- Working groups/stakeholders
- Current grassroots policy examples

Theme F: Knowledge/Policy Gaps
- Gap analysis
- Policy issues
- Technical aquaculture
- Technical mangrove
- Carbon financing in Indonesia/REDD+

ROUND THREE
Theme G: Good or Recommended Mangrove Management Practices
- Adaptive collaborative mangrove management
- Forest Management Learning Groups + other bottom up approaches
- Sustainable logging/silviculture
- Payment for Ecosystem Services
Theme H: Sustainable Coastal/Intertidal Livelihoods (non aquaculture)

- Coastal food security
- Non-timber forest products
- Analyzing natural resources potentials
- Engaging the Business Sector
- Extension approaches
- Post harvest processing
- Sustainability indicators

Theme I: Climate Change & Sea Level Rise - Mitigation and Adaptation

- Mitigation
- Carbon Science
- Erosion Control Measures
- Adaptation
- PES, Carbon Markets
- Coastal Squeeze

Managing Resilience:

Managing resilience involves considering the future. Complex issues such as regional development or climate change are especially challenging because future change in dynamic social-ecological systems can be largely unpredictable. A number of approaches have been developed to tackle these problems, but for the complexities of social-ecological systems, two are particularly appropriate.

One is the development of system models, which can be used to help understand non-linear dynamics. Another approach is the development of scenarios. Scenarios are carefully constructed stories about the future, which include descriptions, events, actors (people), and mechanisms. They are descriptive models or representations about possible alternative paths that a social-ecological system might take.
**Conference Process & Outcomes**

**Event**
- Keynotes
- Parallel Sessions (1)
- Parallel Sessions (2)

**Process**
- Panel
  - Presentation, Small Group Work, Reporting Out

**Outcomes**
- Framing of Issues
- Social, Economic & Ecological Characteristics of Case Studies
- Social, Economic & Ecological Characteristics of Case Studies
Event | Process | Outcomes
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Talk Show | 3 Guests, Interviews, Q & A | Clarity with Regards to National Policy and Strategy
Technical Demonstrations | Outdoors, Informal | Sharing on Best Practices/Networking
Parallel Sessions (3) | Presentation, Small Group Work, Reporting Out | Social, Economic & Ecological Characteristics of Case Studies
Event

Resilience Thinking & Adaptive Capacity

Process

2 Presentations

Outcomes

Common Understanding

Models, 3-5 Scenarios per case study

Synthesis

Facilitated

Recommendations to National Mangrove Strategy (SNPEM)
References:


Melati, Kuntum. 2013 “Gender Challenge: Economic Resilience in Coastal Community Household.” The Nippon Foundation Fellowships for Asian Public Intellectuals


