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Expert Panel Presentation II.2:
Aquaculture and Socio-economic Growth and Development: Enabling Policies and Partnership for Improved Benefits

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Outline

- Background
  - Conference on Aquaculture Development in the Third Millennium 20-25 February 2000 Bangkok, Thailand
    - Bangkok Declaration and Strategy for Aquaculture Development Beyond 2000
- Objectives
  - Review aquaculture’s socio-economic impacts in the new millennium
  - Discuss institutional factors that facilitate aquaculture’s positive socio-economic impacts and/or mitigate negative impacts
Literature

- Global situation
  - SOFIA 2006, 2008
  - The State of world aquaculture 2006 (FAO)
  - Aquaculture: Changing the Face of the Waters: Meeting the Promise and Challenge of Sustainable Aquaculture (World Bank, 2006)

- Asia's situation
  - Analysis of aquaculture development in Southeast Asia: a policy perspective (FAO Fisheries and Aquaculture Technical Paper. No. 509, 2009)

- Latin America’s situation
  - Aquaculture development in Latin America: policy, institutional and economic dimensions (FAO Fisheries Technical Paper (forthcoming))

Bangkok Declaration and Strategy for Aquaculture Development Beyond 2000

- 2.1 During the past three decades aquaculture has become the fastest growing food-producing sector and is an increasingly important contributor to national economic development, the global food supply and food security;

- 2.17 The potential of aquaculture to contribute to human development and social empowerment cannot be fully realised without consistent, responsible policies and goals that encourage sustainable development;

- 2.18 The aquaculture sector should continue to be developed towards its full potential, making a net contribution to global food availability, household food security, economic growth, trade and improved living standard.
Socio-economic impacts of aquaculture

- Environmental responsibility
  - Habitat conservation
  - Land & water
  - Wild species
  - Energy
- Economic viability
  - Contribution to economic growth
  - Impacts on other industries
  - Competition within aquaculture
- Social acceptability
  - Poverty alleviation
  - Food security
  - Human development
  - Women empowerment
  - Community cohesion and social order

Institutional arrangements for environmentally responsible aquaculture

- Laws and regulations
- Environmental impact assessment (EIA)
- Environmental taxes
- Eco-labelling
  - Self-regulation
    - Codes of conduct
    - Farmers associations
    - Best or better management practices
Institutional arrangements for economically viable aquaculture

- Trade barriers
  - Tariffs
  - Anti-dumping
  - Market standards
- Public interventions in aquaculture production
  - Property rights
  - Seed production
  - Feed production
  - Capital
  - Foreign direct investments
  - Technology and know-how

Institutional arrangements for socially acceptable aquaculture

- Public policies
- NGOs
- Community-based aquaculture
- Co-management
Habitat conservation

- Progress
  - Stricter regulations
    - Clearing of mangroves for aquaculture banned in most Asian countries
  - Replanting and restoring
  - Coastal planning and management measures (zoning, EIA, etc.)
  - BMP (citing approaches, farm construction, feed management, etc.)

- Issues
  - Bottom ecosystem (coral reef, sea grass)
  - Organic wastes
  - Freshwater marshes and wetlands
    - Improper aquaculture practices

Land and water

- Positive impacts
  - Rehabilitating sodic lands
  - Providing nutrient rich mud
  - Reducing nutrient and heavy metal load in water

- Negative impacts
  - Land salinization
  - Eutrophication & algal bloom
  - Chemical pollution

- Measures
  - Planning and management (zoning, EIA, etc.)
  - Resource conserving aquaculture practices
    - Using land unsuitable for other purposes
    - Rotating use of land for agriculture and fish farming
    - Integrated operations (e.g. rice-fish farming)
    - Recirculation or closed water system
Wild species

- Positive impacts
  - Reducing pressure on fisheries
  - Restocking programs
- Negative impacts
  - Environmental degradation
  - Collection of wild species for seed
  - Introduction of exotic species
  - Aquaculture escapees
- Measures
  - Regulation on seed collection (licensing, official fry collection stations)
  - Artificial breeding
  - Removal of escapees as a precondition for farm licenses
  - Selecting sites with least impacts on wild stocks
  - Promoting aquaculture practices that prevent escapees

Energy

- Aquaculture operations require energy:
  - Operation
    - Impacts of high energy prices (feed) on aquaculture?
    - Impacts system dependent
  - Is water recirculation system more environmentally friendly?
    - Direct impacts on environment / indirect impacts through high energy consumption
    - Full lifecycle needed to evaluate the tradeoffs
Contribution to economic growth

Aquaculture

Linkage impacts
- Backward
- Forward
- Income

Direct contribution
- Value added
  - Labor income
  - Business profits
  - Tax revenues
- Employment

Other impacts
- Infrastructure
- Human capital
- Productivity
- Foreign exchange

Aquatic production: capture vs. culture

World aquatic production (million tonnes)

Marine fish
Freshwater fish
Shellfish
Aquatic plant
Aquatic animal

0 20 40 60 80
1984-86 1994-96 2004-06

capture  culture
Aquatic production: capture vs. culture

World aquatic production (million tonnes)

Measuring aquaculture’s economic contribution—usually difficult for various reasons—Impacts on other industries

- Competition with other industries: Agriculture, fisheries and tourism.
- Aquaculture as a less established newcomer not given priority—resource restriction and environmental impact surveillance.
- Complement to capture fisheries:
  - Increasing demands for fisheries products
  - Reducing costs of seafood processing and marketing
  - Putting competitive pressure to make capture fisheries more efficient
Competition within aquaculture

- Positive impacts
  - Affordable seafood for consumers
  - Technology advances
  - Species diversification
  - New markets
  - Quality improvement

- Negative impacts
  - Trade disputes
  - Flooding the market

Pro-poor aquaculture

- Poor people lack
  - capital and access to credit
  - technical skills and management expertise
  - political influence and bargaining power

- Public support
  - tax exemption and subsidies
  - infrastructure construction
  - providing quality seeds
  - training and extension
  - technology innovations and transfer
Pro-poor aquaculture: Small-scale operations

- Advantages
  - Less resource demanding
- Disadvantages
  - More flexible
  - Lack of economy of scale
  - Difficult to coordinate
- Successful stories
  - Thailand - Policies in place limiting farm size
- Less successful stories
  - Africa - Policies biased against large.
- High value vs. Low value

Pro-poor aquaculture: Large commercial operations

- Suspicion against large commercial operations
  - Profit driven - Exploit the poor to benefit the rich
- Merits of large operations
  - Economy of scale
  - Technology innovations
  - Benefits the poor through employment and economic growth
- Policy issues
  - Are regulations biased against large operations in Southeast Asia and Africa justified?
    - Can small-scale farmers compete with large companies in the international market?
Seafood as poor people’s food

Seafood as a protein source in 2005

Aquaculture’s contribution to food security
Fish as an animal protein source

Animal protein intake (g/capita/day)

High-trophic species farming and food security

- Biological perspective
  - Use more biomass to produce less

- Economic perspective
  - Provide employment and labor income
    - Positive impacts on food access
  - Feed production driving up the prices of food-grade pelagic species
    - More expensive fish
    - More income

- Policy
  - Regulations restricting use of food-grade species for feed production justified?
  - Can biological efficiency and economic efficiency be reconciled?

- Evidence on negative impacts of high-trophic species farming on food security
  - Not well documented
  - No consumption decrease of pelagic species
  - Micro data may tell a different story
Fish used as feed

Utilization of Fish Products (million tonnes)

Major fishmeal exporters

Fish meal export to the world market (kg)
Major fishmeal importers

Fish meal import from the world market (kg)

Fish Trade Balance = Fish export – fish import

Fish Trade Balance (million tonnes)
Fish Trade Balance (Africa and Oceania)

Food fish demand in the future (estimated based on population growth only, not considering economic growth)
Aquaculture’s contribution to human health

- Provide high quality protein
- Provide important nutrients
  - Omega-3 fatty acid
  - Minerals
- Food safety
- Avoid pollution by farming in controlled environment
- Chemical and drugs during farming operations
- Quality of feed ingredient
- Disease
- Aquaculture ponds control disease vectors
- Poorly managed aquaculture can cause water-born diseases
- Professional hazards.

Aquaculture’s contribution to knowledge and technology

- Training and extension
- Technology innovations
- Research (disease prevention, artificial breeding, nutrition)
Women empowerment

- Women’s participation in aquaculture
  - Seed collection
  - Post-harvest processing
  - Trading
- Constraints faced by women in aquaculture
  - Lack of resources (land)
  - Social attitude
    - Women active in aquaculture in Africa and Asia.
- In general, still gender imbalance (male dominant). There’s evidence of aquaculture empowering women.

Community cohesion and social order

- Employment and business opportunities help check out-migration
- Aquaculture may attract immigration, may disrupt community order
- Income inequality: some become rich, some become marginalized, lead to social conflicts
- Export-led aquaculture open the community to the outside world, has repercussion
- Indigenous people’s right may not be protected
- Social impacts of aquaculture not well understood
Legal force: Environmental laws and regulations

- Laws and regulations for environmental protection more comprehensive and stringent
  - Site selection, farm size, use of water, feed, chemicals, and wild species, disease control, escapee control, etc.
- Lack a comprehensive regulatory framework specifically for aquaculture
  - Only aquaculture-related chapters or clauses under more general fisheries laws
  - Environmental regulations applicable to aquaculture usually established and implemented by diverse agencies
  - Difficulties in monitoring and enforcement tend to make environmental regulations over aquaculture ineffective
- Reactive instead of proactive

Legal force: Environmental impact assessment

- More popular
- Only for new projects, not applying to ongoing operations or addressing existing problems
- Evaluate impacts of individual projects independently, may not account for the aggregate impacts
  - Not effective for the situation where there are many small-scale operations
- Compliance costs
  - Cumbersome for small-scale operations
Market force: Eco-labelling

- Use market force to enforce environmental responsibility
  - More popular
  - Used mostly and widely in developed markets
- Issues
  - Certifying and compliance costs
  - May shut small-scale farmers out of the market
  - Being used to gain market power
  - Proliferation of certification schemes
- Research on the impacts of certification on aquaculture lacking

Moral force: Self regulation

- Codes of conduct
  - Many codes of conduct or technical guidelines have been established by international agencies, governments and the industry
  - Fulfillment of these codes hard to monitor
  - Their impacts not well understood
- Farmers association
  - Peer pressure to enforce codes of conduct
- Best or better management practices (BMP)
  - Making environmentally friendly practices economically profitable
Trade barriers: Tariffs and Dumping

- **Tariffs**
  - Tariffs over seafood products generally low
  - Tariffs over processed seafood products subject to relatively high tariffs
  - Tariffs for seafood imports in developing countries relatively high

- **Anti-dumping**
  - Often used non-tariff trade barriers in seafood trade
    - EU and US against salmon (1990s)
    - US against shrimp and catfish (2000s)

Market standards: Public vs. private

- **Public safety standards**
  - Stringent in developed countries (barrier for small-scale farmers)

- **Private standards**
  - **Pros**
    - Public standards insufficient and incompetently implemented.
  - **Cons**
    - Unjustified, Unnecessary (duplications of safety standards) unfair and uneconomical
Property rights

- Means
  - Licenses, permits, concession, authorization

- Tenure
  - Usually long (more than 10 years) and renewable

- Restrictions
  - Ownership transfer restrained (prevent monopoly)
  - Farm size limited (prevent monopoly)
  - Foreign ownership limited (less than 50%)

- Marine culture in Myanmar as a special case
  - Shorter tenure and less restrictions

Seed production

- Public-private partnership
  - Public hatcheries initially established;
  - After private hatcheries developed.

- Problems with public hatcheries (as non-profit organizations)
  - Supplying low-priced or poor-quality seed and Corruption.

- Public support for development of private hatcheries (as a better alternative)

- Seed production and trade under stricter public regulations
  - Licensing, certification, ISO standards, etc.
  - For the purposes of maintaining seed supply and quality
  - Sometimes have negative impacts on seed producers’ profitability
Feed production

- Feed costs account for a major part of production costs (in intensive operations)
- Shortage of feed ingredients (fishmeal and fish oil)
  - A graph for fish meal and fish oil price
- Regulations over permissible feed ingredients
  - Ecuador: Only residuals from food processing or species not suitable for direct human consumption (concern over food security)
  - Mexico: Fresh crustaceans (except artemias) NOT allowed
  - Chile: Use of animal meat NOT (Concern over food safety)
- Public support over feed production (Asia)
  - Tariff reductions or exemptions on imported feed ingredients
  - Public support to help find other cost-effective feed ingredients
  - Increase the productivity of feed production through promoting large-scale feed mills and encouraging foreign investments

Capital

- *Capital has been a major bottleneck for aquaculture development*
- Constraining factors
  - Risky nature of aquaculture
  - Less understanding of aquaculture and lack of human capital involvement
- Public support in Asia
  - Encouraging banks to lend to small farms
  - Financial support to farmers’ cooperatives
  - Public-initiated loan programs
  - Interest rate subsidies and Tax breaks, etc
- *Foreign direct investments- popular way for underdeveloped sectors to overcome financial constraints*
Technology and know-how

- Technology and know-how underprovided in the private sector:
  - Farms usually lack resources and incentives to undertake aquaculture research
  - Controversy over the extent of private IPRs (e.g., whether genetic modified organisms (GMO) are allowed to be patented);
  - And the social benefits and costs of private IPRs in aquaculture are generally unclear.
- Proper public-private partnership needed
  - Public-funded research needs to be guided by industry needs.
- Institutions involved
  - Government agencies, fish stations, one-stop Aqua Shop (OAS), international agencies, NGOs, farmers association
- Obstacles
  - Inadequacy of extension messages results lack of assimilation of technical assistance

Pro-poor public policies

- African countries' experience
  - Policies overemphasized on promoting small-scale aquaculture
  - Resulting in an underdeveloped aquaculture sector predominated by government or donor-driven investments as opposed to commercially-oriented private ventures
- Latin American countries' experience
  - Private initiatives backed up by significant institutional support
  - Over intervention ("duplication of effort") and over regulation ("excess of rules and powers")
- Asian countries' experiences
  - Commercial aquaculture (the "transition pathway" and the "consolidation pathway") more effective for poverty alleviation
- Lessons learned:
  - Pro-poor public policies should enable the poor participation in aquaculture business
  - Governments and international agencies should create an enabling business environment through capacity building, technology innovations and other public goods that tend to be underprovided by the private sector.
Non-government organizations (NGOs)

- NGOs’ contributions to aquaculture development
  - Providing training and extension services
  - Facilitating research and technological innovations
  - Developing standards and codes of conduct, organizing farmers
  - Promoting BMPs
  - Participating in public policy decision making,
  - Monitoring public programs and private businesses,
  - Educating consumers and increasing public awareness

- NGOs become more powerful
  - Certification to gain consumers’ support
  - Companies more willing to cooperate with NGOs
- More power means more responsibility

Community-based aquaculture

- Community or cluster-based aquaculture help farmers
  - Gain access to markets, credits and technologies
  - Share experiences, information and risks
  - Enforce codes of conduct
  - Promote BMPs
  - Increase bargaining power
  - Enhance community cohesion

- Community-based aquaculture has mainly been a tool used by donors and NGOs to promote pro-poor aquaculture
- Can it become a self-sustained institutional arrangement for facilitating socially responsible aquaculture?
- How community-based aquaculture can help develop social capital?
- How public policies and NGOs can facilitate this process?
Co-management

- Command and control measures not likely to result in socially acceptable aquaculture development
  - Complex socio-economic impacts involve many tradeoffs
- Co-management
  - A decentralized decision-making process intended to share rights and duties among all stakeholders
  - Increasingly popularity in aquaculture management
- Examples of co-management
  - NGO’s involvement in decision-making process
  - Partnership between producers associations and scientific communities
  - Partnership between NGOs and the industry
  - Partnership among individual fish farmers
- How can co-management become mainstream?

The way forward

- Challenges
  - More stringent environment protection requirements
  - Higher food safety standards
  - Lack of aquaculture sites, freshwater and other natural resources
  - Shortage of feed
  - Increasing energy prices
- Improvements in institutions
  - Enabling public policies
  - More efficient regulatory framework
  - Better partnership among stakeholders