Literature Review on Shrimp Farming – Synthesis Report

Pascal Raux

European Commission

THE FIFTH FRAMEWORK PROGRAMME
EUROPEAN COMMISSION
Research Directorate General
Shared Cost
Programme "Conforming the international
role of community research" (1998-2002)
RESEARCH FOR DEVELOPMENT (INCO-DEV)

Project PORESSFA **INCO-DEV Project No. IC4-2001-10042**

Policy Research for Sustainable Shrimp Farming in Asia
A Comparative Analysis of Bangladesh, India, Thailand, and Vietnam with particular reference to institutional and socio-economic aspects

- Centre for the Economics and Management of Aquatic Resources CEMARE University of Portsmouth UK
- Centre for the Law and Economics of the Sea CEDEM University of Western Brittany, France
- Bangladesh Centre for Advance Studies BCAS Dhaka Bangladesh
- University of Agricultural Sciences UAS Bangalore India
- Coastal Resources Institute CORIN Prince of Songkla University Thailand
- Research Institute for Aquaculture RIA-1 Bac Ninh Vietnam

Literature Review on Shrimp Farming – Synthesis Report

www.poressfa.org

2004

Literature Review on Shrimp Farming
Synthesis Report

by
Pascal Raux
CEDEM

For bibliographies, this document may be cited as:

Raux P., 2004. "Literature Review on World Shrimp Farming, Synthesis Report". Policy research for sustainable shrimp farming in Asia. European Commission INCO-DEV Project No.IC4-2001-10042, CEDEM University of Western Brittany, Brest, France, 9p.

Centre for the Law and Economics of the Sea CEDEM
University of Western Brittany, France
12, rue de Kergoat - Bâtiment B - BP 816 - 29285 Brest Cedex - France
Tel : +33 (0)2 98 01 73 09 Fax : +33 (0)2 98 01 69 35

This report tempts to sum up and synthesise the main findings from the 5 following individual partner reports issued through the Work Phase 1 (Literature Review) of the PORESSFA project:

Ahmed S. A., Mallick D. L., Md. Liaquat Ali and Rahman A.; 2002. "Literature Review Report on Bangladesh Shrimp". Individual Partner Report for the Project: Policy research for sustainable shrimp farming in Asia. European Commission INCO-DEV Project No.IC4-2001-10042, CEMARE University of Portsmouth UK and BCAS, Dhaka, Bangladesh, 31p

Nhuong T.V., L.T. Luu, T.Q. Tu, P.M. Tam and T.T.A. Nguyet; 2002. "Vietnam shrimp farming review". Individual Partner Report for the Project: Policy research for sustainable shrimp farming in Asia. European Commission INCO-DEV Project PORESSFA No.IC4-2001-10042, CEMARE University of Portsmouth UK and RIA1, Bac Ninh, Vietnam, 19 p.

Nissapa A., Boromthanarat S., Chaijareonwatana B., and Charoenkunanont W.; 2002. "Shrimp Farming in Thailand – A Review of Issues". Individual Partner Report for the Project: Policy research for sustainable shrimp farming in Asia. European Commission INCO-DEV Project No.IC4-2001-10042, CEMARE University of Portsmouth UK and CORIN, PSU, Hat Yai, Thailand. 72p.

Raux P.; 2002. "Literature Review on World Shrimp Farming". Individual Partner Report for the Project: Policy research for sustainable shrimp farming in Asia. European Commission INCO-DEV Project No.IC4-2001-10042, CEDEM University of Western Brittany, Brest, France, 46 p.

Vasudevappa C. and Seenappa D.; 2002. "Literature Review of Shrimp Farming in India". Individual Partner Report for the Project: Policy research for sustainable shrimp farming in Asia. European Commission INCO-DEV Project PORESSFA No.IC4-2001-10042, CEMARE University of Portsmouth UK and FRS University of Agricultural Sciences, Bangalore – India, 48 p. + Annexes.

Literature Review Synthesis

The objective of the Literature Review was to provide the most up-to-date information regarding the research carried out in the four partner countries and over the rest of the world, on the topics of ecological impacts and economic performances, current shrimp farming development and industry status, current state-of-knowledge on Institutional Arrangements and Social Impacts of shrimp farming activities. The literature review underlines very different development profiles and policy options in the four countries. If at the world level global trends are found in terms of environmental and social impacts, as well as in terms of technical and legal issues, key policy options and stakeholder organization rather appear at the national or regional level.

In Thailand and India, social and environmental problems don't appear at the top of the agenda in spite of critics from environmental NGOs. The relative oldness of these problems and the actions and regulations undertaken may have resulted in this present situation. In India, the ban of shrimp aquaculture in the Coastal Regulation Zone and the limitation to 10 PL/m^2 have strongly contributed to this lower present concern. On the opposite, in Thailand, the ban of inland shrimp farming and the decision to devote a large part of the coastal area to shrimp culture as one of the major industry of the country have also impacted the awareness of these problems.

Between those two countries, Bangladesh and Vietnam are at a key point of their shrimp farming development in terms of public policy choices and industry orientation. Both countries are marked by extensive culture systems, but at a lower degree in Vietnam where a more important diversity of technical systems are found. Today, one of the main important issue for the two countries remains the contribution of shrimp farming development to poverty alleviation in a sustainable way, but also to contribute to the exports and increase the foreign currencies income. Those two objectives appear as rather difficult to combine and are at the origin of great difficulties in the management of the activity.

In terms of techniques, every country can present very different or specific technical organization as the first steps of the development were mainly driven by environmental and economic constraints. Then it is quite illusive to compare techniques among the different shrimp producing countries in spite of same technical appellation. Local environmental, socio-economic and institutional context strongly influences the technical organization. The purpose is then to identify the different development profiles such as small scale artisanal and family farms in confined ecosystems and low access to inputs, improved extensive farms in semi-opened coastal ecosystems or intensive and capitalistic farms under different ecosystems and access conditions to knowledge. At the world level it is difficult to isolate a specific production system to another one. In terms of economic performances, systems are rather close, excepted systems at intermediate level of intensification underlining lower technical efficiency due to a trend to overstock in pond designed and managed for lower intensification level. But facing international market threats, the most intensive systems are also the most costly and research focuses both on a better technical efficiency (brood stock domestication, better quality feed) and gain in productivity through the reduction of production costs. At present the main answer is more based on a reduction of the stocking density for intensive systems (India and Thailand).

Development profiles are more discriminated in terms of their potential for collective action, particularly when the capacity for State action is weak. Beyond of environmental and

technical issues (water management, diseases, etc.), numerous examples of collective action also addressing social and economic issues (conflicts use, access to market and knowledge, etc.) are found.

Problems involving public/collective actions are multiple. Looking back over thirty years, the same scenario is played out time and again in different regions. It is marked with a slow spread of practices, more often by trial and error than by the transfer of fully-mastered knowledge. Then, where attempts have proved to be conclusive, there is an explosion in production, followed by a crisis which can lead to complete disappearance following a legal ruling (permanent or temporary bans) or through a lack of economic viability. After a latent period, some adjustments can be made which sometimes enable producers to embark on a new phase of development (Figures 1 and 2). It is difficult to say whether these highly endogenous developments, based on low-intensive techniques, escape more easily the vicious circle of boom and bust than the high-intensive production rolled out by major investors. What is certain is that many rural communities have exhausted their land and financial resources on this venture. Important public funds have also been invested and sunk, in some cases with irreversible short and medium effects. However, this aspect of the problem is not at the core of concerns raised by private, collective or public decisions.

Shrimp farming development is confronted by a speculative logic, fed by the success of more or less distant neighbours and the initial illusion of how easy it is to raise production. In respecting a number of technical standards, it appears relatively easy to enter into shrimp farming. Thousands of smallholders are experimenting with this every year, simply trying to do what their neighbour is doing. The result, which generally exceeds what any other use of the same area of land could hope for, generates an appetite for more, which translates into an increase in stocking density. However, there is a limit to the level of intensification that an ecosystem-pond can support and productive capacity is reduced along with crops due to eco-system deterioration over time and technical standards remain undeveloped due to a lack of knowledge and capital. The expected result becomes more and more uncertain, but the occasional gains make the losses easy to forget and we can see the behaviour of the gambler arise, leading many farmers to ruin. As well as unsuitable individual practices, there is also the fact that the interdependence of ponds through water flow and circulation is not sufficiently taken into account. The lack of any collective investment in the creation and management of hydraulic systems is causing self-pollution. This risk is now well-known and taken into account to a reasonable extent where emerging sectors are being assisted. But in the recent past, it constituted a major factor in crises.

Figure 1 Estimates on World Shrimp Aquaculture Production 1975 - 2002 (1 000 MT – Globefish)

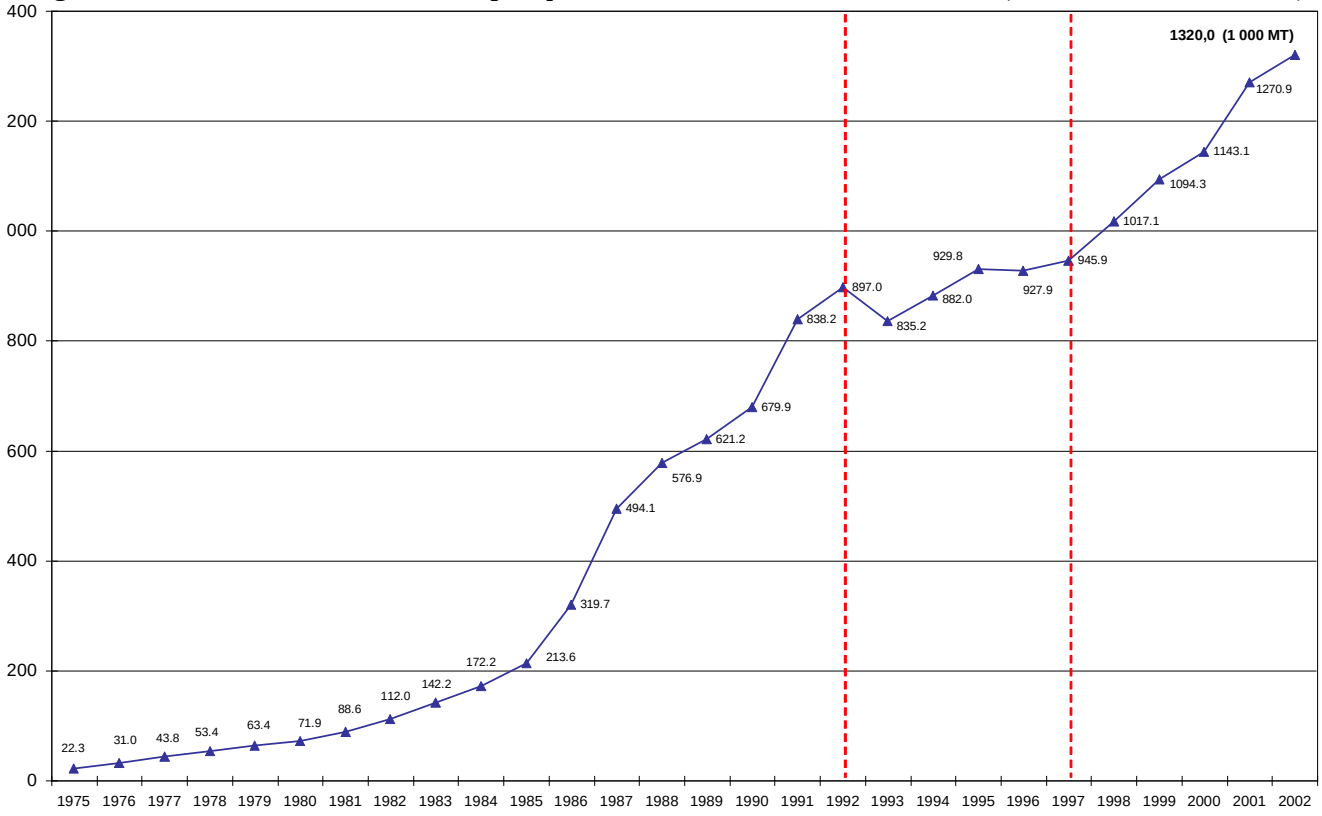
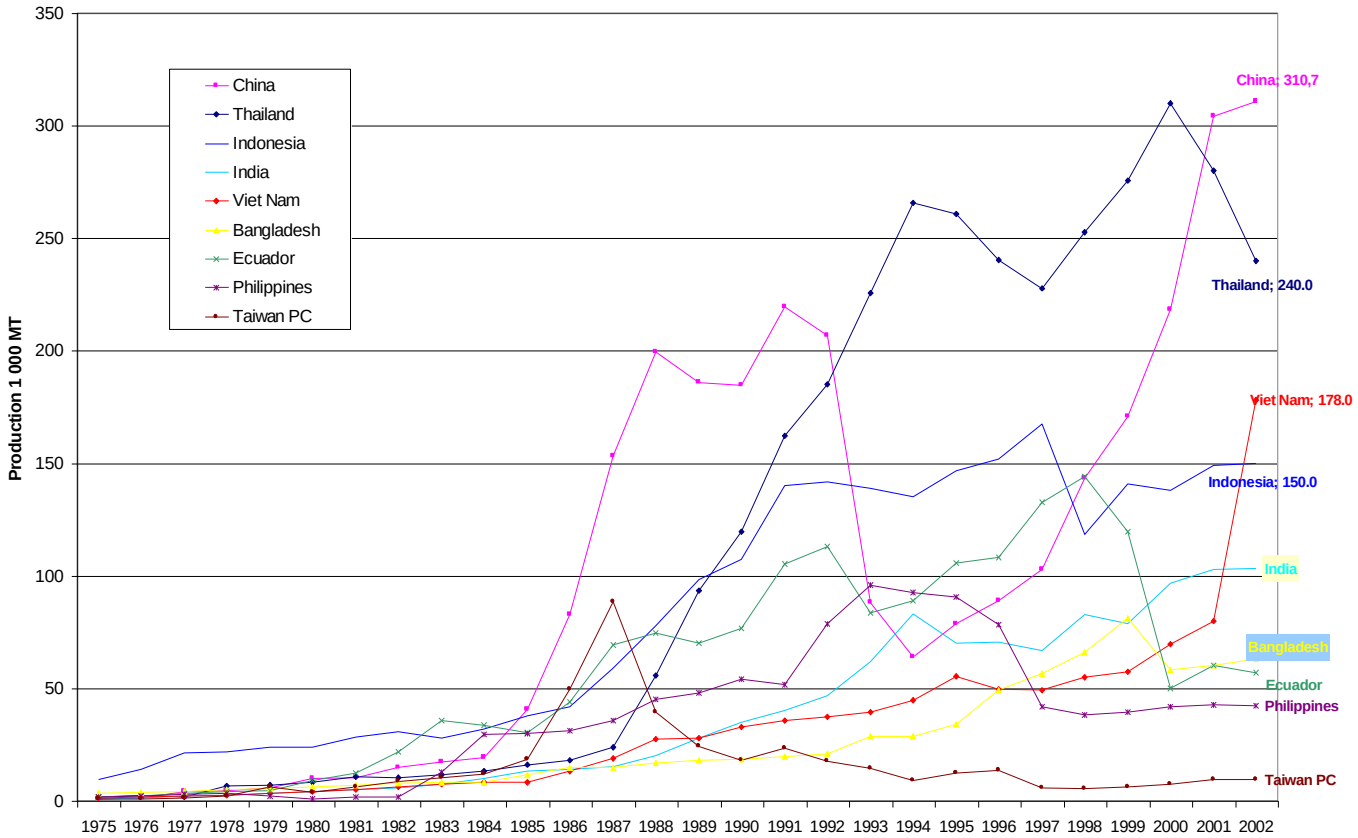
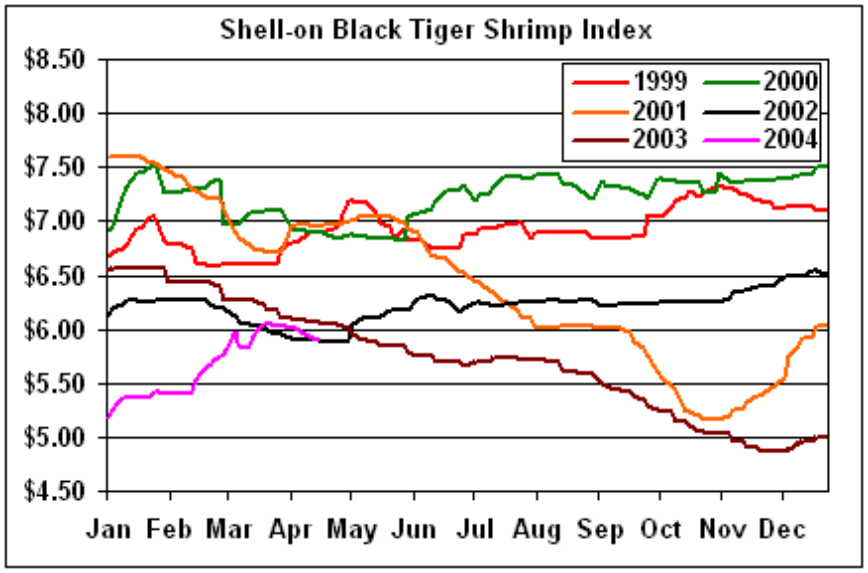


Figure 2 Estimates of Shrimp Aquaculture Production per country 1975 – 2002
(1 000 MT – Globefish)



The spread of disease is also a major source of instability. These are extremely complex problems, all threatening the interdependence of ponds and stocks via the circulation of water and the transfer of animals. Knowledge is limited and difficult to spread to all the people concerned. The response is all the more difficult, as the use of antibiotics has been forbidden due to the impact of their dissemination into open environments, both in living organisms and in human health via the trophic chain. Disease has also been one of the main reasons affecting the stability of the world supply, and also one of the main fears for producers, and plays a major part in crises as regulator. But there are regulators we would like to do without. This will result in greater awareness in the most mature sectors for the need to combine an individual preventive approach in farming practices (ensuring greater resistance in animals by not pushing the limits of their resistance) with a collective approach in areas as diverse as controls over animal transfer, protection against disease, collective water management and warning systems. Increased global growth is largely the result of disease control (change of species, change of technical practices) at the price of increasing production costs while prices are falling. This represents a reversal of what has been happening over the past thirty years (Figure 3).

Figure 3 Black Tiger Shrimp price Index from 1999 to 2004 – US Imports



(Urner Barry Publications, Inc., 2004)

The introduction of a new activity with high potential earnings in what are often deprived areas cannot be done without a major overhaul of social structures and the distribution of wealth. This also causes the phenomena of appropriation (or destruction) with the transfer of rights over local resources (land, water, mangroves) often won as a kind of pre-emptive right, creating wealth for some people and poverty for others. In the most extreme cases, a development started off by purely speculative and exclusively external investment may produce very little redistribution of wealth and also be highly destructive. By redistributing access to resources, it generates social disorder (crime, violence, insecurity, forced depopulation or displacement, etc.) and exclusion connected to land speculation, when shrimp farming generates collateral damage and conflicts over resource use. The risks are numerous: salinisation or exhaustion of ground water, salt water intrusion into vegetable crops, acceleration in coastal erosion, destruction of mangroves, impoverishment of coastal waters, and various forms of pollution. This arises from latent or sporadic conflicts, reaching extreme tensions, shrimp wars, leading to almost total (Taiwan) or partial (India) bans, hugely limiting

the potential for development. In the opposite case, pressure brought to bear on a state such as Vietnam through individual initiatives has led to institutional innovations enabling an explosion in production and more clarity in land use rights. Extreme cases of the exclusion from wealth distribution and displacement of people to make way for huge projects (Inti Plasma) have also demonstrated the importance of the social dimension.

This development made to the detriment of many coastal ecosystems – destroyed to make way for shrimp, or affected by waste (limited carrying capacity), shrimp farming is often at the core of the aquaculture/environment debate. Certain weak points in the environmentalist argument have diverted attention towards the topic of good practices, as well as skilful lobbying and communication campaigns. In the zootechnical, environmental and even the social field, we have tried to convince ourselves of the possibility of resolving many problems by the introduction of codes of good practices, under the sole responsibility of the producers. Studies show that the reasoning behind campaigns on the topic of Best Management Practices (BMPs) above all respond to this need for communication, as well as the need to compensate for falls in productivity increases caused by disease control. Today, commercial crises linked to limits on demand, food safety requirements and to protectionism are being skillfully used to hide the fact that from both an environmental and a social point of view, when confronted by high competition, this sector is capable of the worst practices, justifying citizens, the public regulatory authority, the international community, coastal communities and the industry to question themselves and to act.

Marked by ever stricter product regulations for consumers in industrialised countries, food safety currently constitutes another significant factor of uncertainty. The difficulty of implementing product traceability and in having this recognised, is leading to a situation whereby if any traces of antibiotics are discovered in a sample test, it can lead to the produce of an entire country being banned from being imported. The distance – not only geographical but also the wide gap between regulatory requirements – between importing countries and the needs of small producers from Vietnam or Bangladesh makes the problem of what we call here the industry organisation, more complex than the one posed by the BSE problem in beef, for example. Responses can be individual, as suggested by those promoting the best management practices and certification. But those responses also require that producers and the public authorities pool their efforts so that this large factor of uncertainty weighs less heavily on the collective future of producers and on the economic viability of their produce.

International exchange regulations are also becoming a major concern for shrimp farmers. Several countries are now subject to anti-dumping procedures in the framework of the WTO. Import duties are applied as a compensatory measure, thereby reducing their competitiveness. Any aquaculture products mainly geared towards export are liable to be held to this kind of inconvenience. The impact can be devastating, whether dumping practices are proven or if turns out to be a short-term protectionist strategy. Just as with the food safety issue, this poses a problem for the quality of development based solely on seeking foreign currency by export. In order to escape these external constraints, shrimp production for high-income local consumers is currently being developed. This is an interesting response, using the appropriate incentives it can be used to limit the consequences arising from a lack of product competitiveness and the difficulty in ensuring quality control in countries such as Thailand.

The issue of GMO in aquaculture, bringing together both environmental and food safety issues, has often supplanted mangrove or aquifer issues in environmental debates and the aquaculture industry has been able to come together to urge a precautionary approach (GAA).

Influential political circles are paralysed by the obscurantism around this issue. But this is a sensitive issue in people's minds, and can generate strong reactions. Only the higher cost of development and access to this biotechnology are currently preventing the system from receiving any real attention from the sector. While a few rupees are enough to purchase antibiotics in the backwaters of any Asian country, access to genetic resources is much more difficult.

These are just a few of the problems facing public and private decision-makers. The international community is also being consulted by the shrimp farming industry about the relationship between maintaining certain coastal ecosystems and development needs. The development of aquaculture, and not just of shrimp farming, also poses questions about the use of halieutic stocks. Would it be more worthwhile to turn sea protein into fishmeal for aquaculture, to the detriment of halieutic stocks? The method of organising shrimp farming is also coming under scrutiny. Should extensive practices be encouraged ahead of intensive practices? Should the field of aquaculture preferably be practiced in small, traditional units or rather with highly integrated industrial development? It is not certain that this is the best way to address these issues. The issues of individual and collective strategies at risk, incentives for actors who encourage environmental and social considerations to be taken into account, the quality of public debate at both local and international level governing collective choices relating to both objectives and means, are probably more decisive.

Today, it seems that after market forces, through strong economic incentives, drove South East Asian countries on the way to a dramatic and unsustainable development of shrimp culture in the 90s, the same markets forces will drive shrimp farming development under a more rational, organized and better controlled development. The strong price decrease of the last years has started to balance many lottery logics and is often seen as an opportunity to reorganize the shrimp sector on a better sustainable way. Push to act, facing stronger and stronger environmentalist and social organizations' pressure and after the lack of fulfilment of BMPs and other technical answer, the industry is now calling to act collectively.

Table 1: Main impacts and consequences of tropical peneid shrimp culture development

Environment	Social	Legal	Institutional
Degradation of ecosystems and mangrove area Alternative uses and ecological importance of these ecosystems. Lack of quantitative valuations. **Salt water intrusion** **Food and pollution / Food insecurity** Discharges, non-assimilated feed and chemical products; antibiotic groups being toxic for others species and human food consumption, ban of exportation (EU). **Disused ponds** Irreversibility on short run due to acido sulphate soils. **Larvae and broodstocks / Biodiversity** Decline of PL and broodstock (overexploitation and mangrove clearance; introduction of exotic species)	**Access to land and land tenure system** Privatisation of common areas, disturbance in traditional land tenure systems. **Employment** Generation of direct and indirect employment; valuation of costs and benefits at the market chain level vs. costs and benefits for local communities? Employment level according to production systems; rural exodus or population fixation? Lack of global valuation. **Social conflicts and poverty** Conflicts between poverty alleviation and environmental protection illustrating market failures. Conflicts related to structure changes in local communities. Indirect price increasing of humans' goods related to shrimp culture.	**Laws mainly aimed at reducing shrimp culture's externalities through regulations and standards; very few laws in support of the activity (sanitary aspect mainly).** Existing laws and regulations covering coastal uses and activities, but problem of compliance and effectiveness. Specific laws implemented with and after shrimp culture development but essentially aimed at: the land tenure system, water management, mangrove preservation and sanitary standards. Few financial incentives through licences or input/output taxes to drive the activity development on a more sustainable way. Direct income through existing fees on shrimp products are not specifically devoted to the shrimp industry management.	**The Institutions concept can have a different meaning for different groups. This is reinforced by the confusion between the legal and institutional position of aquaculture.** At a national level: public choices under pressures of environmental and industrial organisations or local communities. Choosing between producing for foreign currencies and exchange or giving importance to the way to product. Uses of shrimp benefits in support to policy aimed at balancing shrimp culture externalities. The large amount of bureaucracy involved in the sector management increases organisational problems. At a local level: looking for a single institution based on local communities, local gvt. Or from the industrial point of view looking for a favourable context to develop concerted actions to implement better management practices. Divergence between private and social optimum Private choices (shrimp culture is an activity like any other ones) vs. public choices (implication of public policy stakes) At international level: Standards and CoC or BMPs