Applying Integrated Natural Resources Management to Sustain Coastal Fisheries

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Abstract

Vietnam's coastal waters feature high bio-diversity and rich fishery resources. The selected study site, Nha Phu Lagoon is characterized by massive degradation of coastal fishery resources. As a result rural livelihoods in coastal communities are threatened. Since households in these communities not only depend on coastal resources but also have various other forms of income outside the fishery sector a multi-sectoral approach is necessary. A multi-sectoral approach not only addresses all these issues but also takes account of the complexity and diversity of the resource system and its users. Integrated Natural Resource Management (INRM) is one multi-sectoral research approach that aims to develop innovative and flexible management forms to manage natural resources in a more sustainable way. The applied INRM-approach is characterized through strong interdisciplinary and participation. Interdisciplinary means that socioeconomic and institutional aspects, e.g. resource-user groups and existing legal arrangements are combined with biological as well as production system aspects, e.g. stock assessment as well as aquaculture or gear-fishing techniques. The focus lies on the identification of multiple equal important starting points to improve natural resources. Through the integration of biological and socioeconomic aspects, complex problems were identified within the coastal fishery resource system and its users during a six months investigation period. In group-discussions and interviews reasons for the destruction of fishery resources were gathered, e.g. trawling, population increase and pollution from shrimp ponds. This information was then shared with participants, which led to new insights as well as alternative resource management strategies. Illegal trawl-fishermen for example were said to be extremely poor and therefore needed to be treated with great tolerance despite their negative impacts on coastal fishery resources. But during follow-up visits it was discovered that illegal fishermen often belonged to middle-class households around Nha Phu Lagoon and that lax enforcement rather encouraged illegal fishing and punished those fishermen using traditional fishing methods. The participatory approach induced awareness-building and strengthened local decision-making structures. Considering sociological, political, economic and biological elements in the coastal fishery resource system could lead to more sustainable resource management in the future.
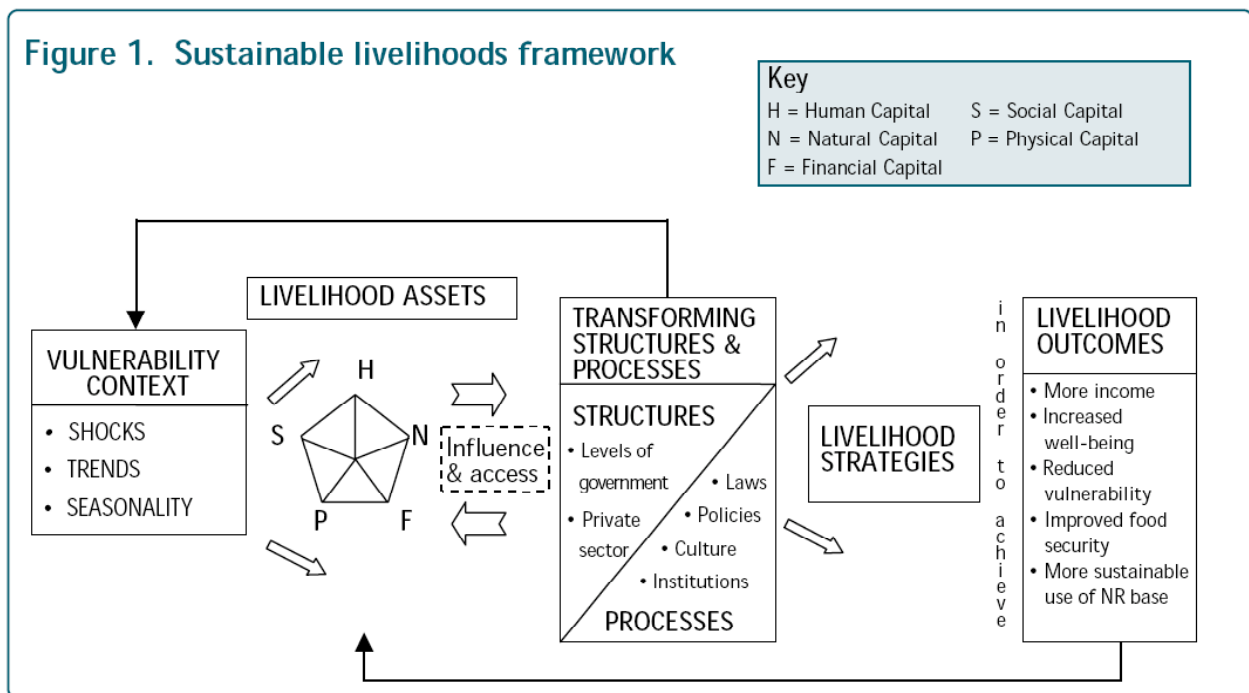
Introduction

Vietnams coastal waters feature rich fishery resources. With 1600km of coastline many livelihoods in coastal communities depend directly or indirectly on fishing or aquaculture. Seafood products also provide most of the protein consumed in Asian diets today. Coastal fishery resources are not only important to supplement human diets; broodstock from wild stocks fuels the growing importance of Vietnams shrimp and lobster industry and coastal waters provide spawning and nursery grounds for the growing offshore fisheries. For this reason recent developments, namely the degradation of coastal fishery resources, gain significant importance for Vietnams future fishery sector. A large share of rural poverty is spread amongst coastal communities highlighting the importance of addressing the issue of degrading coastal fishery resources. Since households in these communities not only depend on fishing or aquaculture but additionally on agriculture or trading for example a multi-sectoral approach is necessary. A multi-sectoral approach not only addresses this situation but also the fact that pollution from agriculture or aquaculture impacts negatively on coastal waters. This example shows the interdependency between the sectors and explains why the complexity and diversity of the resource system and its

users can only be addresses through an integrative, multi-sectoral approach such as the integrated natural resources management (INRM) approach.

The objective of the present article is to introduce the central concept of INRM, specify the research methods and framework used, provide some examples of usefulness of INRM, and share some lessons learned from applying INRM in a coastal fishery environment.

Integrated Natural Resources Management
Natural resources management (NRM) has been continuously altered due to unsolved problems of sustainability and poverty alleviation. Adapting the term 'integrated' in 1997 by the CGIAR heralded a new era of research. In the following years a conceptual framework of INRM research evolved and definitions are still evolving. The following blend of definitions explains best what INRM stands for: "INRM is an approach,..., incorporating the multiple aspects of natural resource use (biophysical, socio-political, economic or technological),..., into stakeholder-driven processes of adaptive management to improve livelihoods, agroecosystem resilience, agricultural productivity and environmental services,..." (Adapted from THOMAS, 2002; CAMPBELL et al. 2000). Integrated natural resources management is one multi-sectoral research approach that aims to develop innovative and flexible management forms to manage natural resources in a sustainable way. Thereby research strategies to improve livelihoods are implemented together with the resource users. A paradigm change is that INRM scientists do not try to stay objective but instead develop relationships and become actors in the natural resources system. In theory there is a large number of operational models, methods, tools, guiding principles and frameworks. However, when applying INRM a more simple and practical conceptional framework is needed. The following elements proved most important for successfully applying INRM and contain a multitude of applicable knowledge when viewed in more detail. The central concept of INRM is based on the sustainable livelihoods framework developed by DFID (2000) (Figure 1). This framework acts as a tool in INRM research and reminds the INRM scientist of the multiple livelihoods aspects and the complexity of a natural resource system.

Figure 1. Sustainable livelihoods framework

Key
H = Human Capital   S = Social Capital
N = Natural Capital   P = Physical Capital
F = Financial Capital

Source: DFID (2000)

Putting livelihoods in the center of the contemplation various INRM elements complete the framework that INRM research comprises.

- Partnerships, or vertical and horizontal scaling as referred to in the literature, is one such element. The establishment of partnership between different stakeholders and on different system levels is vital for the acceptance, participation, and the broad adaptation of integrated natural resources management across wider areas.

- Participatory action research (PAR) is another element. This iterative research approach adapts the research process to changing circumstances. PAR exists since a long time and there are a large number of publications that describe the use and its advantages.

- A 'learning cycle' is an element unique to INRM. The introduction of a learning cycle enables the researcher to share research findings together with the participants. By this means participants reflect on what they have said to reflect and encourage awareness building. On the other hand research findings are verified and deeper understanding of the natural resource system can be achieved. Learning cycles can be established during a group discussion for example. The scientist acts as a facilitator or mediator, e.g. when inviting conflicting stakeholder groups. This element is not only a powerful tool to gain deeper understanding or to strengthen participation it also directly encourages and empowers participants to engage in the research process.

- Interdisciplinarity, already incorporated in the word 'integrated' is another element vital to INRM. This calls for an inter-sectoral problem analysis followed by an interdisciplinary research approach when dealing with factors in the natural resource system related to certain disciplines.

Problem Background & Research Objective

The overall problem, namely the degradation of coastal fishery resources in Vietnams coastal waters, promotes rural poverty. Parts of coastal fishery communities in Vietnam, like other rural communities, not only belong to one of the poorest in the country; without alternative livelihoods and low inshore catch per unit effort (CPUE)[1] they continue to exploit the coastal resources they depend on (Nguyen Chu Hoi, 2003). Nguyen Chu Hoi (2003) describes several reasons of the overexploitation of coastal fishery resources: coastal and marine habitat destruction, low awareness of resource exploitation, limited sectoral management capacity and institutions, and few inter-sectoral policies (Nguyen Chu Hoi, 2003).

The overall goal[2] of the research was to improve rural livelihoods in coastal fishery communities. Regarding human resources and a given time frame three main research objectives were adapted that appeared to be essential to solve the problems: i) analyze the coastal fishery sector ii) develop a framework and identify starting points for the successful introduction of INRM iii) operationalization of applied methods. To guide the research a working hypotheses was developed: applying the integrated natural resources management approach to natural resource systems leads to more insights than other participative research approaches. Although there is little evidence from applied INRM to support this assertion, there are numerous publications on participative research in natural resources management. This paper will review some preliminary findings from applying INRM to a coastal fishery environment, and will highlight the importance in natural resource science while being clear about that current knowledge of applied INRM is not yet sufficient to draw comprehensive comparisons.

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[1] Catch per unit of effort (CPUE): The quantity of fish caught (weight) by a certain amount of effort (e.g. fishing time, gear type). CPUE can be compared between different types of gear and used as a measurement for the abundance of fish.
[2] Hagmann et al. (2003) refers to this as "vision".

Research Methods and Framework

Campbell and Hagmann (2003) present 11 'cornerstones' as an operational research framework for successfully managing INRM processes. These cornerstones act as a guideline to the INRM scientist not to get lost in the research process. However, despite this comprehensive model for guiding the R&D process one needs to choose the appropriate methods in pursuing his vision. The three-volume sourcebook "Participatory Methods in Community-based Coastal Resource Management" from the International Institute of Rural Reconstruction (IIRR, 1998) provided a basis of participatory methods used specifically for coastal settings. At first, qualitative methods were chosen to establish partnership between the various stakeholders, learn more about the coastal fishery sector, rural livelihoods, and existing problems. Methods included were:

- Identification of key informants
- Semi-structured interviews
- Focus-group discussions
- Resource mapping

In addition, more quantitative methods were selected such as:

- Questionnaires
- Venn-diagrams
- Matrix-ranking

The combination of qualitative and quantitative methods is an important and recognized technique that leads to an improved quality of information (MARSLAND et al. 2001).

In order not to get lost in the research process a research framework was established and followed. This framework was complemented with the key drivers, the key response variables, and the key intervention points of the problem being addressed, namely the degradation of coastal resources. In the literature the process of identifying the key drivers of the research matter remains unresolved (CAMPBELL & HAGMANN, 2003). However, as it is stated there they reveal themselves in the research process (CAMPBELL & HAGMANN, 2003).

The following research framework was set up:

- Analysis of the multi-stakeholder system
- Analysis of decision-making rationales
- Analysis of the natural framework
- Analysis of the institutional framework

All the methods were applied by means of facilitation to encourage awareness building and self-reflection.

Lessons from Applying INRM

Applying INRM is a very process- and result-oriented research, i.e. as the INRM scientist becomes an actor himself he experiences how different stakeholder groups perceive their living and how after each 'learning cycle' new problems reveal themselves. Problematic is that applied INRM should be incorporated into existing or planned projects, as the research process itself already is part of implementing, namely awareness building amongst participants and the establishment of partnerships. In terms of natural resource science this research approach, although delivering the most effective and comprehensive answers of complex natural resource management systems, requires a responsible application as expectations are raised and need to be met by concrete planning and action.

The expectations mentioned above should rather been seen as an asset or opportunity than a threat. The answer to the experienced positive collaboration of participators and scientist lies in the close integration into the research process. Letting stakeholders participate in the research design not only opens the doors to people but in extend leads to result-oriented research and a wide acceptance of the researcher and his work. When visiting fishermen for the first time for example and explaining the research 'vision' participants were skeptical and discussions yielded

scattered information. During follow-up visits participants experienced ones determinedness, the collected information could be verified and 'real' problems detected. One possible explanation is that not only people are taken serious and listened to but that for the first time in their lives they engage in a research process, that firstly puts livelihoods in the center, secondly not only asks participants for their opinion, but thirdly seeks to establish a dialog between the stakeholders (the scientist being a stakeholder himself, acts as a mediator between the different and often conflicting stakeholder groups). Illegal trawl-fishermen for example were said to be extremely poor and therefore needed to be treated with great tolerance despite their negative impacts on coastal fishery resources. But during follow-up visits it was discovered that illegal fishermen often belonged to middle-class and rich households around Nha Phu Lagoon and that lax enforcement rather encouraged illegal fishing and punished those fishermen using traditional fishing methods. This information was an interesting and new fact to fishermen as well as policy makers. Up to then the marine border police, partly responsible for enforcement of fishery regulations, had the perception that they could not enforce laws strictly, because it will 'draw poor people against the wall', an expression used to symbolize the hopeless situation fishermen using illegal fishing techniques were in.

These mediation and facilitation processes and especially the repetition of the 'learning cycle', i.e. the sharing of research findings with participants, have lead to strong awareness building amongst participants. Consequently in the beginning of the field research resource-users had no or little opinion about the degradation of resources their livelihoods depend on. Later in the research process local people not only took a stand but also were developing ideas and debating with others how to manage the coastal resources in a more sustainable way. Reflecting on their daily lives encouraged people to stop and think and the set of ideas ranging from biological-technical to institutional-organizational demonstrated their willingness and ingenuity to change things.

One can imagine that in this complex research process and through developing empathy to the felt needs of the participants the researcher can easily get lost. Therefore a strong conceptual research framework is needed as described in the previous section. What makes the research framework functional and applicable are the key drivers that one wants to discover. For the degradation of coastal fishery resources the key drivers were the growing population, the growing demand for seafood products, and the shrimp industry. The 'number of boats' instead of the 'catch per unit effort' was identified as key response variable. This is, because no statistical data is available and only few fishing boats are registered. The number of boats in the fishing area proved to be easier assessed and controlled than CPUE. Last but not least key intervention points were identified in and outside the multi-stakeholder system and on different system-levels. The identification of these key elements driving the coastal fishery sector in Nha Phu Lagoon proved vital in guiding the research and keeping it goal and process-oriented. This point cannot be emphasized enough, because INRM research goes beyond participatory methods, and on one hand the scientist might find himself identifying with the day to day problems of the researched but on the other hand he might loose track of his research and fail to achieve his research objectives.

Another emphasis lies on the balance that needs to be achieved between social and natural sciences. In the exploratory phase of the research social sciences will help to understand people and their interactions and therefore the natural resources management better than using natural sciences. Later in the research process when developing management strategies together with participants, how to manage resources more sustainable, it proved vital to adapt a more natural science based point of view to help and guide discussions to become fruitful.

In other words a team approach to INRM is essential. This work was carried out by one person only but in collaboration with strong research partners, which expertise could be tapped regarding fisheries management through the WorldFish Center on Penang, Malaysia, aquaculture through the Research Institute for Aquaculture No. 3, and socio-political aspects of the coastal fishery

sector and participatory methodologies used in a coastal fishery environment through the University of Fisheries both of Nha Trang, Vietnam.

Conclusion

Integrated natural resources management is a possibility to manage resources more effectively and with greater participation of the associated communities. What makes INRM unique to other resource management strategies, for example CBRM, is the integrated 'learning cycle'. This tool alters the perspective of every single participant. Scientists become aware of the complex problems inside the natural resource system and the people become aware of their action and of the complex issues that need to be dealt with. This awareness building on both sides is what lays the basis for an active engagement in the natural resource system. Dealing with different interest of various stakeholder groups in a coastal fishery sector requires compromises and a willingness to change; both can be achieved through applying INRM.

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