WorldFish
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Reducing poverty and hunger by improving fisheries and aquaculture

2009 Publications Catalog

Publications Catalog 2009

This catalog lists publications published by The WorldFish Center and papers contributed by the Center's scientists in 2009. It reflects the outcomes of research carried out in collaboration with partners from 27 countries through the generous support from international investors. The majority of which are members of the CGIAR.

The catalog is divided into 4 sections:

- Corporate publications
- Staff Refereed publications
- Staff Non-refereed publications
- Other Key WorldFish publications

They are sorted alphabetically by the surname of the primary author and abstracts are provided. The index of WorldFish authors at the end of this catalog will lead you to specific pages for easy referencing. The accompanied CD-ROM provides the full text of the 2009 WorldFish published titles.

The number of contributions at the time of publishing this catalog is:

	2009
• Corporate publications	11
• Staff Refereed publications	73
• Staff Non-refereed publications	3
• Other Key WorldFish publications	38

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CORPORATE PUBLICATIONS

Annual report 2008/09. The WorldFish Center. Penang. 10 p.

Along with a feature on our climate change work, this year's Annual Report covers topics like fish breeding, coral reef work, post-cyclone rehabilitation, big numbers, and helping the most disadvantaged through aquaculture, to name just a few.

Medium term plan 2010-2012. The WorldFish Center. Penang. 96 p.

This Medium-Term Plan (MTP) sets out the WorldFish Center response for harnessing fisheries and aquaculture to help address the global issue of food shortage and poverty by addressing two key development challenges: i) expanding sustainable aquaculture, and ii) ensuring productive and resilient small-scale fisheries. The MTP is developed around six major areas: 1. Global drivers of change 2. Markets and trade 3. Multi-level and multi sectoral governance 4. Improving sustainable aquaculture technologies 5. Aquaculture and the environment 6. Resilience in practice for small-scale fisheries.

List of Publications by the Business Development and Communication Division

Donor programming for economic development, food security, environment, health and gender. The WorldFish Center Review 1994. Penang, Malaysia. 76 p.

This book provides a compilation of reviews of investor programming. The analyses focuses on thematic areas of economic development; environmental issues, food security and health and social issues. Specific chapters are devoted to analyses of investor interests in areas of aquaculture and fisheries, markets and trade, governance & fisheries management, environmental issues including biodiversity, climate change, disasters, food security and nutrition, HIV and waterborne issues related to human health and gender. Overview tables are provided showing investor bilateral priorities and investor thematic priorities. It is a useful resource for identifying partnerships and funding for development programs and research. Because the analysis was prepared for WorldFish staff and partners, also included is a review of programs specific to fisheries and aquaculture. A companion document for WorldFish staff looks at funding opportunities for the MTP and reviews current project funding, pipeline and looks at additional opportunities with over 25 major donors.

Communications strategy and plan. The WorldFish Center Working Strategy Paper 2013. Penang, Malaysia. 38 p.

WorldFish exists (mission) to reduce poverty and hunger through fisheries and aquaculture and given its research for development remit it can only succeed by being the Science Partner of Choice (vision) for delivering solutions. Communication is a key pillar to achieve both the mission and vision. This strategy addresses 3 key objectives: 1) Advocacy and Fundraising: to continue to increase global attention to role of fish in development and build recognition for WorldFish's role to deliver science solutions to reduce poverty and hunger 2) Uptake of research: to increase uptake and use of WorldFish's research. 3) Build capacity of staff to communicate: to enhance effectiveness of staff as 'ambassadors' of the Centers mission and vision and to help translate the work of the Center so all staff have clarity about the Centers mission. The strategy provides a number of approaches to address the above including key messages to help position our work with the new CGIAR Mega Programs.

Knowledge management strategy and plan. The WorldFish Center Working Strategy Paper 2014. Penang, Malaysia. 36 p.

WorldFish exists to have impact as elaborated by our mission statement. We aim to achieve this by being the science partner of choice: the partner everyone wants to work with; and the organization everyone wants to work for. Knowledge management (KM) is central to achievement of WorldFish's mission and vision. KM will enhance organizational performance by lowering costs, avoiding rework of 'recreating the wheel' accelerating innovation, ensuring the outputs of our research are accessible, available and applicable to our key stakeholders, ensure strategic partnerships are in place and ultimately our impact on poverty and hunger. KM and learning are at the heart of the Centre's core values and are prominent in WorldFish's overarching strategy . This strategy and plan builds on existing initiatives and activities of the Center and harnesses new ideas and concepts that have worked for partner organizations. The strategy aims to enhance KM and learning both within WorldFish and with our partners.

The WorldFish Compendium Series – Funded by The International Development Research Centre of Canada.

1. Compendium of funding opportunities for research, education and development projects in Asia.

   The WorldFish Center Compendium 1992. Penang, Malaysia. 205 p.

2. Compendium of funding opportunities for research, education and development projects in Africa

   The WorldFish Center Compendium; 1991. Penang, Malaysia, 196 p.

3. Compendium of scholarship and fellowship opportunities

   The WorldFish Center Compendium; 2018. Penang, Malaysia. 165 p.

4. Compendium of funding opportunities for research, education, and development projects in Latin America

   The WorldFish Center Compendium 2019. Penang, Malaysia. 161 p.

5. Marine compendium: Compendium of Foundations supporting marine research and development projects

   The WorldFish Center Compendium; 1942. Penang, Malaysia. 41 p.

2008 Publications catalog. The WorldFish Center. Penang. 46 p.

This catalog lists more than 100 refereed and non-refereed publications published by The WorldFish Center and papers contributed by the Center's scientists in 2008. It reflects the outcomes of research carried out in collaboration with partners from different countries through the generous support from international investors.

REFEREED PUBLICATIONS

Adhuri, D.S. 2009.

Social identity and access to natural resources: ethnicity and regionalism from a maritime perspective. p. 134-152. In: Sakai, M. ; Banks, G. ; Walker, J.H. (eds.) The politics of the periphery in Indonesia: social and geographical perspectives. Singapore: NUS Press. 360 p.

In this book chapter, the author examines the concept of "Wawasan Nusantara", how it is related to the marine fishery policies in Indonesia, and the conflicts arises from local fishing communities because of difference in ethnicity.

Agnese, J.F. ; Brummett, R. ; Caminade, P. ; Catalan, J. ; Kornobis, E. 2009.

Genetic characterization of the *Aphyosemion calliurum* species group and description of a new species from this assemblage: A. campomaanense *(Cyprinodontiformes: Aplocheiloidei: Nothobranchiidae)* from Southern Cameroon. Zootaxa 2045: 43-45.

The *Aphyosemion calliurum* species group is poorly diagnosed by chromatic and meristic characteristics leading various authors to propose different species as members. We used partial sequence of the mitochondrial cytochrome b gene to characterize all species that have been at one time or another included in the A. calliurum species group. Results obtained allowed a clear definition of the group which is composed of 10 species: *A. ahli, A. australe, A. calliurum, A. celiae, A. edeanum, A. franzwerneri, A. heinemanni, A. lividum, A. pascheni*, and a herein newly described species A. campomaanense.

Ahmed, N. ; Allison, E.H. ; Muir, J.F. 2009.

Rice fields to prawn farms: a blue revolution in southwest Bangladesh? Aquaculture International [online].

This paper examines freshwater prawn (*Macrobrachium rosenbergii*) farming in southwest Bangladesh where a large number of farmers have converted their rice fields to export oriented prawn farms, locally known as gher. The gher design potentially provides good opportunities for diversified production of prawn, fish, rice and dike crops, that has brought about a 'blue revolution'. The average annual yield of prawn, fish and rice was estimated at 467, 986 and 2,257 kg ha-1, respectively. Large farmers produced higher production due to more inputs, larger farm size and longer experience of prawn farming than others. All farmers in different gher size categories (i.e., small, medium and large) made a profit, with seed and

feed dominating variable costs. Despite a higher production costs per hectare, the average annual net return was higher in large farms (US$2,426), compared with medium (US$1,798) and small (US$1,420) farms. Prawn production in gher systems has been accompanied by a great deal of social and economic benefits. Most farmers associate the blue revolution with increases in income and living standards. Socioeconomic benefits of the households of prawn farmers depend on resource ownership (i.e., farm size) and are very apparent. Nevertheless, a number of significant challenges, particularly social and environmental issues, are vital in translating its benefits effectively to the thousands of rural poor.

Ahmed, N. ; Lecouffe, C. ; Allison, E.H. ; Muir, J.F. 2009.

The sustainable livelihoods approach to the development of freshwater prawn marketing systems in Southwest Bangladesh. Aquaculture Economics & Management 13(3): 246-269.

A conceptual framework, drawn from an approach to poverty reduction known as the Sustainable Livelihoods Approach (SLA), is applied to understanding the role of freshwater prawn (*Macrobrachium rosenbergii*) marketing systems in southwest Bangladesh. Freshwater prawn marketing potentially provides economic returns and social benefits to the rural poor. Although the potential benefits are great, a number of constraints were identified for the longterm sustainability of prawn marketing systems. The study used the SLA framework as an analytical tool to identify ways to strengthen livelihoods of prawn traders and associated groups.

Allison, E. ; Springate-Baginski, O. 2009.

Livelihood assessment tools. p. 57-74. In: Springate-Baginski, O.; Allen, D. and Darwall, W.R.T.(eds.) An integrated wetland assessment toolkit: a guide to good practice. IUCN, Gland, Switzerland; IUCN species programme, 144 p.

This chapter presents livelihood analysis concepts, and provides an operational model for livelihood analysis in the context of wetland systems. It recommends a generic ‘nested’ sampling approach, and gives guidance on a range of data collection methods.

Allison, E.H. ; Barange, M. ; Dulvy, N.K. 2009.

Sustaining fish supplies for food security in a changing climate. p. 59-62. In: Climate Sense: Climate Predictions and Information for Decision Making. A publication for the World Climate Conference 3, Geneva. World Meteorological Organisation and Tudor Rose Ltd, Leicester, U.K.

The potential impacts of climate change on fishing communities and fishing supplies are profound. To tackle this issue involves 1. Strengthening science to inform adaptation needs and mitigation options. 2. Putting knowledge into policy and practice. 3) Collaboration for climate change adaptation.

Allison, E.H. ; Beveridge, M.C.M. ; van Brakel, M. 2009.
Climate change, small-scale fisheries and smallholder aquaculture. p. 109-122. In: Wramner P., M. Cullberg and H. Ackefors (eds.) Fisheries, sustainability and development. Royal Swedish Academy of Agriculture and Forestry, Stockholm.

Fisheries and aquaculture both contribute to meeting the Millennium Development Goals but vulnerability to climate change threatens the contribution that they make to development. Impacts of climate change on small-scale fisheries are of great relevance to poverty reduction. Poverty undermines the resilience of social-ecological systems such as fisheries. The majority of the world's 250 million fisherfolk lives in areas that are highly exposed to climate change. A combination of climate-related stresses and widespread overexploitation of fisheries reduces the scope for adaptation and increases risks of stock collapse. Aquaculture can utilize aquatic resources of marginal economic value and can provide a diversification strategy in the face of environmental change but is also susceptible to external risk factors, including climate change. This chapter examines the concepts of vulnerability, adaptive capacity, and resilience in relation to discussion on adaptation to climate change.

Allison, E.H. ; Perry, A.L. ; Badjeck, M.C. ; Adger, W.N. ; Brown, K. ; Conway, D. ; Halls, A.S. ; Pilling, G.M. ; Reynolds, J.D. ; Andrew, N.L. ; Dulvy, N.K. 2009.
Vulnerability of national economies to the impacts of climate change on fisheries. Fish and Fisheries 10(2):173-196.

Anthropogenic global warming has significantly influenced physical and biological processes at global and regional scales. The observed and anticipated changes in global climate present significant opportunities and challenges for societies and economies. We compare the vulnerability of 132 national economies to potential climate change impacts on their capture fisheries using an indicator-based approach. Countries in Central and Western Africa (e.g. Malawi, Guinea, Senegal, and Uganda), Peru and Colombia in north-western South America, and four tropical Asian countries (Bangladesh, Cambodia, Pakistan, and Yemen) were identified as most vulnerable. This vulnerability was due to the combined effect of predicted warming, the relative importance of fisheries to national economies and

diets, and limited societal capacity to adapt to potential impacts and opportunities. Many vulnerable countries were also among the world's least developed countries whose inhabitants are among the world's poorest and twice as reliant on fish, which provides 27% of dietary protein compared to 13% in less vulnerable countries. These countries also produce 20% of the world's fish exports and are in greatest need of adaptation planning to maintain or enhance the contribution that fisheries can make to poverty reduction. Although the precise impacts and direction of climate-driven change for particular fish stocks and fisheries are uncertain, our analysis suggests they are likely to lead to either increased economic hardship or missed opportunities for development in countries that depend upon fisheries but lack the capacity to adapt.

Badjeck, M.C. ; Allison, E.H. ; Halls, A.S. ; Dulvy, N.K. 2009.
Impacts of climate variability and change on fishery-based livelihoods. Marine Policy [Online].

There is increasing concern over the consequences of global warming for the food security and livelihoods of the world's 36million fisherfolk and the nearly 1.5billion consumers who rely on fish for more than 20% of their dietary animal protein. With mounting evidence of the impacts of climate variability and change on aquatic ecosystems, the resulting impacts on fisheries livelihoods are likely to be significant, but remain a neglected area in climate adaptation policy. Drawing upon our research and the available literature, and using a livelihoods framework, this paper synthesizes the pathways through which climate variability and change impact fisherfolk livelihoods at the household and community level. We identify current and potential adaptation strategies and explore the wider implications for local livelihoods, fisheries management and climate policies. Responses to climate change can be anticipatory or reactive and should include: (1) management approaches and policies that build the livelihood asset base, reducing vulnerability to multiple stressors, including climate change; (2) an understanding of current response mechanisms to climate variability and other shocks in order to inform planned adaptation; (3) a recognition of the opportunities that climate change could bring to the sector; (4) adaptive strategies designed with a multi-sector perspective; and (5) a recognition of fisheries potential contribution to mitigation efforts.

Badjeck, M.C. ; Mendo, J. ; Wolff, M. ; Lange, H. 2009.

Climate variability and the Peruvian scallop fishery: the role of formal institutions in resilience building. Climatic Change 94:211-232.

Peru experiences recurrent ENSO (El Niño Southern Oscillation) events during which the Peruvian bay scallop (*Argopecten purpuratus*) undergoes substantial changes in its stock size. In the North of the country strong warm ENSO events are synonymous with floods and river discharges that negatively affect scallop biomass, while in the South increased sea surface temperatures lead to an increase in stock size. This paper explores how formal institutions respond to climate variability and resource fluctuations in the scallop fishery, and what role they play in the maintenance or erosion of resilience. The research shows that formal institutions are slow to learn, self-reorganize and respond to climate variability while fishermen's responses are spontaneous, ensuring a rapid process of individual adaptation. Institutional responses are mostly ex-post, and are not strongly shaped by past experience, thus eroding the resilience of the system. However, fishermen's responses sometimes lead to negative outcomes such as local stock overexploitation or 'invasion' of natural scallop habitats for scallop grow-out, and formal institutions play an important role in resilience building through the control of effort and entry in the fishery. In this paper causal loop diagrams are used to conceptualize the fishery system to highlight key variables and processes. The study thus provides the opportunity to explore the usefulness of causal loop diagrams and conceptual models combined with participatory approaches in the exploration of the resilience of a system. The case study also illustrates that individual adaptation, a feature of resilience, is occurring and will occur spontaneously, changing property right regimes and responding not only to climate variability but also market forces. In order to maintain and build resilience and engender positive management outcomes, formal institutions not only need to shape fishermen decision-making, they must also contribute to knowledge building as well as the adoption of innovative approaches.

Baran, E. ; Myschowoda, C. 2009.

Dam and fisheries in the Mekong Basin. Aquatic Ecosystem Health and Management 12(3): 227-234.

This paper draws on approaches in ecology, biology and policy analysis to examine the tensions between dams and fisheries in the Lower Mekong Basin. We review the exceptional importance of Mekong fisheries in terms of total catch, economic value and their role in rural livelihoods. The ecological conditions necessary to sustain the fish production are also analysed. The paper then considers the implications

of dam development in the Mekong Basin, drawing on recent research to review predicted changes in hydrology and the resulting impacts on fishery resources. We then consider why, given the importance of fisheries, these potential impacts are not being addressed in regional policy processes.

Béné, C. 2009.

Governance and decentralization reforms in small-scale fisheries: an African perspective. p. 253-266. In: Wramner P., M. Cullberg and H. Ackefors (eds.) Fisheries, sustainability and development. Royal Swedish Academy of Agriculture and Forestry, Stockholm.

Relying on a framework that highlights different dimensions of 'decentralization', this paper reviews fisheries co-management programmes as they have been implemented over the last 20 years in sub-Saharan Africa. It shows that in most cases, fisheries co-management programmes failed to improve governance, but simply altered the distribution of power and responsibility amongst the different stakeholders. In this new context, the co-management programmes were implemented often at the detriment of the direct endusers (fisherfolk) who benefit from those reforms only in a limited number of cases. Challenging the current narrative that presents participation as the central condition for governance reforms, the review instead highlights the importance of downward accountability. The paper concludes with a series of recommendations.

Bell, J.D. ; Kronen, M. ; Vunisea, A. ; Nash, W.J. ; Keeble, G. ; Demmke, A. ; Pontifex, S. ; Andréfouët, S. 2009.

Planning the use of fish for food security in the Pacific. Marine Policy 33:64-76.

Fish is a mainstay of food security for Pacific island countries and territories (PICTs). Recent household income and expenditure surveys, and socio-economic surveys, demonstrate that subsistence fishing still provides the great majority of dietary animal protein in the region. Forecasts of the fish required in 2030 to meet recommended per capita fish consumption, or to maintain current consumption, indicate that even well managed coastal fisheries will only be able to meet the demand in 6 of 22 PICTs. Governments of many PICTs will need to increase local access to tuna, and develop small-pond aquaculture, to provide food security. Diversifying the supply of fish will make rural households in the Pacific more resilient to natural disasters, social and political instability, and the uncertainty of climate change.

Béné, C. 2009.

Are fishers poor or vulnerable? Assessing economic vulnerability in small-scale fishing communities. Journal of Development Studies 45(6): 911-933.

An index of economic vulnerability is developed and used with a more conventional measure of income poverty to explore vulnerability and chronic poverty in isolated rural communities. The method is applied to data from remote rural fishing–farming communities in Congo. The analysis highlights the high vulnerability of full-time fisherfolk and identifies mobility as a key factor increasing vulnerability. In line with other recent economic research, our work also shows that households can remain highly vulnerable even when their incomes lie well above the average local income. These different results are consistent with the more specialised literature on small-scale fisheries, confirming the robustness of the analysis proposed in this paper.

Béné, C. ; Belal, E. ; Baba, M.O. ; Ovie, S. ; Raji, A. ; Malasha, I. ; Njaya, F. ; Andi, M.N. ; Russell, A. 2009.

Power struggle, dispute and alliance over local resources: analyzing 'democratic' decentralization of natural resources through the lenses of Africa inland fisheries. World Development [published online June].

This paper is based on a global review of fisheries decentralization programs (co-management) in sub-Saharan Africa. Partly challenging the current narrative, but in line with experience in other sectors (e.g., forestry), the review shows that the outcomes of these decentralizations have not been systematically positive. In most cases, fisheries co-management failed to improve governance, but simply altered the distribution of power and responsibility amongst the different stakeholders. In this new political landscape, poorly designed reforms have enabled a variety of (usual and new) local actors to advance their own agendas, often at the detriment of the direct end-users (fisherfolk).

Béné, C. ; Friend, R.M. 2009.

Water, poverty and inland fisheries: lessons from Africa and Asia. Water International 34(1): 47-61.

Relying on experience from West Africa and the Mekong Basin, the authors contend that small-scale inland fisheries are a critical element in the livelihoods of many farming households who live near water bodies in developing countries. Empirical evidence suggests that the relation between poverty and small-scale fisheries cannot be reduced to a simple correlation with income. A more thorough analysis is

required. Using vulnerability and exclusions as two dimensions of poverty, we show that poverty in fishing communities includes a wide range of variables: income but also land ownership, debt, access to health, education and financial capital, and political and geographical marginalization.

Béné, C. ; Obirih-Opareh, N. 2009.
Social and economic impacts of agricultural productivity intensification: the case brush park fisheries in Lake Volta. Agricultural Systems [published online June].

The intensification of agricultural productivity through technological innovation has often been reported to induce considerable social and economic transformation in the rural communities where those innovations are introduced. This paper investigates those changes in the case of acadja, a particular technique for intensifying fishing, which has been adopted in various parts of the developing world. Using the case of Lake Volta in Ghana, the paper investigates the social and economic impacts of this technique, looking in particular into issues of income, assets and (re)distribution of the wealth created by those acadjas. Our analysis shows that the impact of acadjas on fishing communities is mixed. While acadja certainly helps to enhance the supply of protein-rich food and may have trickle down effects at the community level, those positive contributions are greatly reduced by other more negative effects. The data show in particular that acadjas are not a poor-neutral technology in the sense that their contribution to household income seems to benefit disproportionably the wealthiest owners. As such, acadja fisheries often create negative sentiments amongst the households who cannot afford investing in this technology, creating a situation which may lead to social tension and intra-community conflicts.

Béné, C. ; Steel, E. ; Luadia, B.K. ; Gordon, A. 2009.
Fish as the "bank in the water" - evidence from chronic-poor communities in Congo. Food Policy 34(1):108-118.

Small-scale fisheries in developing countries are often perceived as being a low-productivity and backward informal sector. As a result they are rarely considered in poverty reduction programmes and rural development planning. In this paper, we investigate the dual role of fish as a food and cash crop through data collected in river fisheries in Democratic Republic of Congo (DRC). Fishing in this very remote rural region of DRC is operated both by men and women, as part of a household multiple activity livelihood strategy. The data shows that poor households rely heavily on fishing for their supply of protein-rich food, in particular through women's subsistence catches. Fishing also appears to be the main source of cash income

for the majority of households, including local farmers. Based on these findings and a review of the literature, the paper argues that small-scale fisheries can play a fundamental role in local economies, especially in remote rural areas where they strengthen significantly the livelihoods of people through their role in both food security and cash-income generation.

Brooks, S.E. ; Allison, E.H. ; Gill, J.A. ; Reynolds, J.D. 2009.
Reproductive and trophic ecology of an assemblage of aquatic and semi-aquatic snakes in Tonle Sap, Cambodia. Copeia 1: 7-20.

We studied the reproductive and trophic ecology of a group of aquatic and semi-aquatic snakes that face severe hunting pressure in Cambodia. Over a two-year period we sampled hunters' catches, measuring and dissecting a total of 8982 specimens of seven snake species, five of which belong to the family *Homalopsidae*. The seven species—*Enhydris enhydris, Enhydris longicauda, Homalopsis buccata, Enhydris bocourti, Erpeton tentaculatus, Xenochrophis piscator*, and *Cylindrophis ruffus*—all inhabit Tonle Sap Lake, the largest lake in South-East Asia. All species are sexually dimorphic in either body size or tail length. The larger species, *E. bocourti* and *H. buccata*, have a larger size at maturity, and the non-homalopsids, *X. piscator* and *C. ruffus*, have the highest and lowest fecundities, respectively. Clutch size increases significantly with female body size in all species, and with body condition in *E. enhydris*. Our data also suggest that relative investment in reproduction increases with size in *E. enhydris*, which has the largest sample size. All species except one are synchronized in their timing of reproduction with the seasonally receding flood waters of the lake. There was variation in both the frequency of feeding and the prey size and type among species, with the homalopsids more similar to one another than to the other non-homalopsid species. The prey to predator mass ratio ranged from 0.04 to 0.1 in the homalopsids, compared to 0.15 to 0.17 in the non-homalopsids. There was also variation in the feeding frequency between the sexes that differed between species and six species continued to feed while gravid. These detailed life history analyses can help provide a basis for assessing conservation options for these heavily exploited species.

Brummett, R.E. ; Ponzoni, R.W. 2009.
Concepts, alternatives, and environmental considerations in the development and use of improved strains of tilapia in African aquaculture. Reviews in Fisheries Science 17(1):70-77.

The status of African populations of farmed tilapia is reviewed and discussed in light of the need for improved strains for commercial aquaculture. Many tilapia populations currently held on African fish farms have been genetically compromised

through one or more of the following: inbreeding, negative selection, genetic drift, and unregulated hybridization. Their performance is currently 20–40% lower than the wild populations with which they have been compared and almost 100% less than some improved lines. Basic genetic management through the use of rotational mating could at least maintain genetic integrity, whereas selective breeding has the potential to further improve performance. Environmental concerns over the use of improved stocks are based largely on case studies from Atlantic salmon aquaculture and might not accurately reflect the situation of farmed tilapia in Africa. Nevertheless, international guidelines for the conduct of appropriate cost/benefit analyses should be followed when deciding whether to use improved tilapias or not.

Brummett, R.E. ; Syapze, J.K. 2009.

Community management of the Lower Guinea Rainforest ornamental fishery. p. 379-409. In: Diaw, M.C. ; Aseh, T. ; Prabhu (eds.) In search of common ground: adaptive collaborative management in Cameroon. Center for International Forestry Research (CIFOR), Bogor, Indonesia.

Since September 2000, the WorldFish Centre has been studying the biogeography and ecology of Lower Guinea Rainforest rivers in southern Cameroon. In partnership with the Organization for the Environment and Sustainable Development (OPED), a local nongovernmental organization, four rainforest communities are being engaged in an effort to improve the efficiency and sustainability of river exploitation and management. The ultimate goal of this work is to establish functional village-based monitoring and management programmes that ensure the sustainability of commercialized and diversified natural resource exploitation. This chapter summarizes findings to date and progress on the implementation of a socially, economically and ecologically sound ornamental fishery business and management plan for Lower Guinea Rainforest rivers.

Daw, T. ; Adger, W.N. ; Brown, K. ; Badjeck, M.C. 2009.

Climate change and capture fisheries: potential impacts, adaptation and mitigation. p. 107-150. In: Cochrane, K. ; De Young, C. ; Soto, D ; Bahri, T. (eds.) Climate change implications for fisheries and aquaculture: overview of current scientific knowledge. FAO Fisheries and Aquaculture Technical Paper. no. 530. Rome, FAO.

The paper tackles the consequences of climate change impacts on fisheries and their dependent communities. It analyses the exposure, sensitivity and vulnerability of fisheries to climate change and presents examples of adaptive mechanisms currently used in the sector. The contribution of fisheries to greenhouse gas

emissions is addressed and examples of mitigation strategies are given. The role of public policy and institutions in promoting climate change adaptation and mitigation is also explored.

Dugan, P. ; Bandi, B. ; Béné, C. 2009.

Water and fisheries. p. 133-146. In: Wramner P., M. Cullberg and H. Ackefors (eds.) Fisheries, sustainability and development. Royal Swedish Academy of Agriculture and Forestry, Stockholm.

This paper highlights the importance of fisheries and aquaculture in management of the world's water resources. It underlines the value of these resources and the critical importance of managing water quantity and quality for fisheries and aquaculture as well as for other human uses. This will require more holistic approaches to water management and the effective governance systems these require.

Dulvy, N. ; Allison, E. 2009.

A place at the table? (Commentary). p. 68-70. Nature Report: climate change Vol. 3.

International organizations are calling for fisheries to be included in a new global deal on climate change. A consortium of 16 organizations including the UN Environment Programme (UNEP), the Food and Agriculture Organization (FAO), the World Bank and the WorldFish Center issued a policy brief to delegates meeting in Bonn from June 1-12 for the latest round of UN climate talks. Their key message was outlined in a Commentary by two of the authors of the brief published May 28 on Nature Reports Climate Change. Nick Dulvy, Canadian Research Chair in Marine Biodiversity and Conservation at Simon Fraser University, Vancouver, and Eddie Allison, director of the WorldFish Center in Penang, Malaysia, argue that climate impacts represent a serious threat to those who depend on fisheries and aquaculture resources both for protein and as a source of income.

Finegold, C. 2009.

The importance of fisheries and aquaculture to development. p. 353-364. In: Wramner, P. ; Cullberg, M. ; Ackefors, H. (eds.) Fish, sustainability and development. The Royal Swedish Academy of Agriculture and Forestry, Stockholm.

Small-scale fisheries and aquaculture make critical contributions to development in the areas of employment, with over 41 million people worldwide, the vast majority of whom live in developing countries, working in fish production; food

security and nutrition, with fish constituting an important source of nutrients for the poor and often being the cheapest form of animal protein; and trade, with a third of fishery commodity production in developing countries destined for export. With most capture fisheries worldwide considered fully exploited or overexploited, aquaculture will be central to meeting fish demand, which will continue to increase with population growth, rising incomes and increasing urbanisation. As aquaculture develops, however, governments will need to manage its potential ecological and social impacts. African aquaculture, which has grown much more slowly than in other regions, faces numerous challenges, including resource conflicts and difficulties in accessing credit, quality seed and feed, and information. Also key to meeting growing demand will be improvements in postharvest processing to reduce fish losses. Both fisheries and aquaculture are often neglected in national development policy and donor priorities, as policy makers often do not have access to data which reflect the importance of fisheries and aquaculture to development. Appropriate policies and regulation remain important, however, both in managing capture fisheries and ensuring that aquaculture development is pro-poor and sustainable.

Fox, J.J. ; Adhuri, D.S. ; Therik, T. ; Canegie, M. 2009.

Searching for a livelihood: the dilemma of small-boat fishermen in Eastern Indonesia. p. 201-225. In: Resosudarmo, B.P. ; Jotzo, F. (eds.) Working with nature against poverty: development, resources and the environment in Eastern Indonesia. Institute of Southeast Asian Studies, Singapore.

This chapter examines the situation of small boat fishermen in eastern Indonesia, a large number of whom are now engaged in illegal shark fishing in Australia waters. The paper looks at: 1) the historical background to current developments; 2) the general shift from trochus and trepang gathering to sharkfishing that occurred in the 1990's; 3) the rapid increase in the market for shark and the variety of shark that are currently targeted; 4) differences among the four ports along the southern rim of eastern Indonesia from which most of these fishermen sail; 5) the various local networks connected to these different ports and variety of strategies and technologies that have been and are being developed by fishermen from these areas.

Friend, R.M. ; Arthur, R.I. ; Keskinen, M. 2009.

Songs of the Doomed: The continuing neglect of capture fisheries in hydropower development in the Mekong. p. 307-331. In: In: Molle,

F., Foran, T. and Käkönen, M. (eds), Contested Waterscapes in the Mekong Region: Hydropower, Livelihoods and Governance. London: Earthscan.

Since early 2007 there has been a repid acceleration in hydropower development in the Mekong Basin. The consequence of this development on fisheries in the area has been downnplayed. Aim of this chapter Discussion reverts to a 'conventional wisdom' that the captured fisheries are doomed. Fisheries are being downplayed. The aim of this chapter is to place this 'conventional wisdom' of doom under closer critical scrutiny. In doing so, this chapter builds on recent work addressing policy that combines the critical analysis of the arguments, assumptions and narratives that underpin policy approaches.

Froese, R. ; Kesner-Reyes, K. 2009.

Out of new stocks in 2020: a comment on "Not all fisheries will be collapsed in 2048". Marine Policy 33: 180-181.

The authors provide counter argument to the article "Not all fisheries will be collapsed in 2048". Their analysis confirms the continuous absolute and relative increase in collapsed stocks shown first by Froese and Kesner-Reyes (2002) and later by Worm et al. (2006). They found that the number of new stocks entering global fisheries is decreasing and that the global reservoir of unexploited fishable stocks is likely to be exhausted in 2020.

Gordon, A. 2009.

Fish trade in Africa: its characteristics, role and importance. p. 435-442. In: Wramner P., M. Cullberg and H. Ackefors (eds.) Fisheries, sustainability and development. Royal Swedish Academy of Agriculture and Forestry, Stockholm.

This chapter focuses on Africa and illustrates some of the ways in which fish trade affects development – with positive, negative and sometimes unclear outcomes. Although Africa is a minor player in global fish trade (Africa accounts for around five percent of global fish production and global fish trade), fisheries trade nonetheless has important local development impacts. Whilst some of those impacts are clear, others are underreported and poorly understood. An overview of fish trade in Africa including aspects not evident in official data is given, together with selected case studies that illustrate different dimensions of African fish trade. The conclusions focus on important development considerations for the sector.

Gordon, D.V. ; Bjørndal, T. ; Dey, M. ; Talukder, R.K. 2009.

An intra-farm study of production factors and productivity for shrimp farms in Bangladesh: an index approach. Marine Resource Economics 23:411-424.

The production characteristics of shrimp farming in Bangladesh are reported based on a panel of farms for the period 1998 to 2002. The data allow for a profit decomposition based on the Törnqvist index, where differences in relative profits can be explained by differences in productivity, prices, and pond size. The indices indicate that pond size is the most important factor in determining profitability and that the largest farms are the most profitable. However, productivity measured as profit per hectare is only weakly positively correlated with pond size. In fact, the smallest ponds rely more on productivity in generating profit relative to the most profitable farm. These results indicate that small farms are disadvantaged not because they lack the skills to manage, but because the farms are too small. The challenge for Bangladeshi policy makers is to devise methods and procedures to allow small farmers to expand pond size.

Heck, S. ; Holvoet, K. 2009.

The challenge of HIV/AIDS in the fisheries sector in developing countries. p. 459-462. In: Wramner P., M. Cullberg and H. Ackefors (eds.) Fisheries, sustainability and development. Royal Swedish Academy of Agriculture and Forestry, Stockholm.

People in the fisheries sector in developing countries are among those at highest risk to HIV and AIDS. Global data suggest that fisherfolk, including fishers, their families, fish processors and traders, are among high risk groups with infection rates that are five to ten times higher than in agricultural communities in the same areas. Geographically, the spread of HIV/AIDS in the fisheries sector mirrors the spread in the general population, with sub-Saharan Africa showing the highest incidence. Importantly, however, absolute numbers of HIV positive fisherfolk are very high in Asia due to large fishing populations, and case studies from Cambodia, Vietnam and Indonesia suggest that here, too, fisherfolk are among the high risk groups.

Joffre, O.M. ; Bosma, R.H. 2009.

Typology of shrimp farming in Bac Lieu Province, Mekong Delta, using multivariate statistics. Agriculture, Ecosystems and Environment 132:153-159.

This study aims to update the typology of shrimp farms in a province of the Mekong Delta's coastal area. We analyzed technical and economic characteristics

of 170 farms using factor and cluster analysis on the different variables collected during the survey. This allowed us to characterize four different shrimp production systems: intensive commercial and intensive family farms, and the more extensive brackish water polyculture and rice–shrimp farms. The systems differed in their level of intensification, diversification and origin of labor. Labor efficiency was higher in intensive than in extensive farms. The difference in technical practice affected the farm economy and specifically its operational monetary cost which was 25–45 times higher in intensive commercial farms than in brackish water polyculture and rice–shrimp farms, respectively. The intensive commercial farms were significantly less affected by virus outbreak than the extensive brackish water polyculture farms. This last shrimp production system presented a very low shrimp yield but a higher capital use efficiency than intensive commercial farms. Rice–shrimp farms, which are located in a specific agro-ecological environment, presented average sustainability characteristics and an average disease occurrence. Results show that technological investments can reduce the vulnerability to disease outbreak and thus reduce the risk usually associated with shrimp farming.

Kamaruzzaman, N. ; Nguyen, N.H. ; Hamzah, A. ; Ponzoni, R.W. 2009.
Growth performance of mixed sex, hormonally sex reversed and progeny of YY male tilapia of the GIFT strain, *Orechromis niloticus*. Aquaculture Research 40:720-728.

The growth performance of three experimental groups consisting of mixed sex fish (control), hormone-treated fish and progeny of YY male tilapia, all originated from the genetically improved farmed tilapia (GIFT) strain was evaluated. Masculinization of sexually undifferentiated fry was achieved by providing a supplement of 5 mg of 17-a-methyltestosterone per kg of feed over a period of 21 days (after sac absorption). Both mixed sex and progeny of YY male groups were fed a standard commercial ration. Mixed sex fish did not deviate significantly ($P>0.05$) from the 1:1 male to female ratio. Percentages of male averaged 75% in hormone-treated fish and 95% in YY male group over the sampling periods and at final harvest. The effect of sex on weight and length was statistically significant ($P<0.001$). The model used to analyse weight and length included experimental group and sex in each culture period as the fixed effects, and replicate cages as the random effect. Over the culture period of 141 days, there were no statistical differences ($P>0.05$) in body weight and length between mixed sex, hormonally treated and progeny of YY males. There were also no significant differences in level of variability in harvest weight between three groups of fish when the data were classified into five categories (=<100, 100 to <150, 150 to <200, 200 to <250 and =250 g). It is concluded that monosex culture of all male

tilapia would be of no advantage over mixed sex culture for the GIFT strain under conditions of cages suspended in earthen ponds.

Khaw, H.L. ; Bovenhuis, H. ; Ponzoni, R.W. ; Rezk, M.A. ; Charo-Karisa, H. ; Komen, H. 2009.

Genetic analysis of Nile tilapia *(Oreochromis niloticus)* selection line reared in two input environments. Aquaculture 294: 37-42.

Ascertaining the appropriate selection environment for Nile tilapia (*Oreochromis niloticus*) in Africa is a critical issue. Two data sets derived from two selection lines originating from a common base population were analysed in this study. The lines were selected in two different input environments, here named 'low input' and 'high input'. Both data sets were combined and jointly analyzed to estimate the phenotypic and genetic parameters, with a special focus on the examination of genotype by environmental interaction. The data sets included a total of 7640 animals with phenotypic information from three discrete generations. Four different models (in terms of fixed effects) were fitted in univariate (harvest weight) and bivariate (harvest weight in each input line treated as two different traits) animal models to estimate variance and covariance components. The heritabilities estimated from the four different models by univariate analyses ranged from 0.15 to 0.41 (all with standard errors of 0.04). The genetic correlations between harvest weights expressed in the two environments, obtained from the bivariate analyses, ranged from 0.74 to 0.84 (with standard error in the range 0.15 to 0.36). We concluded that there was no significant evidence for genotype by environmental interaction for these two particular input environments.

Khaw, H.L. ; Ponzoni, R.W. ; Hamzah,A. ; Kamaruzzaman, N. 2009.

Genotype by environmental interaction for live weight between two production environments in the GIFT strain (Nile tilapia, *Oreochromis niloticus).* Proceedings of the 18th Conference of the Association for the Advancement of Animal Breeding and Genetics. 28 Sept-1 Oct 2009, Brossa Valley, South Australia. 18:60-63.

A genotype by environmental interaction study was conducted using the live weight data collected from three discrete spawning seasons of Genetically Improved Farmed Tilapia selective breeding program in Malaysia. Two production environments were used to grow-out the progeny, namely, cages and ponds. The analysis was carried by using animal mixed model and treating live weight in cages and in ponds as two different traits to determine the genetic correlation, which was used to quantify the genotype by environmental interaction for these two environments.
Liao, Y.C. ; Reyes, R.B. Jr. ; Shao, K.T. 2009.

A new bandfish, Owstonia sarmiento *(Pisces: Perciformes: Cepolidae: Owstoniinae)*, from the Philippines with a key to species of the genus. The Raffles Bulletin of Zoology 57(2):521-525.

A new bandfish, *Owstonia sarmiento*, is described from specimens collected off East Luzon, Philippines at about 200-300m depth during the AURORA 2007 Expedition. It differs from other known congeneric species in having more dorsal fin rays, two anal spines, more vertebral counts, and the least lateral row scale counts. The species is described (colour photo and radiograph included) and a diagnostic key to species of the genus is provided.

Macuiane, M.A. ; Kaunda, E.K.W. ; Jamu, D.M. ; Kanyerere, G.Z. 2009.

Reproductive biology and breeding of *Barbus paludinosus and B. trimaculatus (Teleostei: Cyprinidae)* in Lake Chilwa, Malawi: implications for fisheries management. African Journal of Aquatic Science 34(2):123-130.

Barbus paludinosus and *Barbus trimaculatus* were sampled in Lake Chilwa and the Mnembo River mouth between February 2004 and January 2005, using nets equivalent to those used commercially, to analyse their reproductive biology and distribution as a basis for recommending sustainable fisheries management and conservation practices.

Maddox, B. ; Allison, E.H. ; Daw, T.M. 2009.

Literacies, development and education in fishing-dependent communities (editorial). Maritime Studies 8(2): 5-8.

Editorial on papers addressing the changing relationships among the various literacies, knowledges and practices in small-scale fishing communities.

Mahfouz, N.B. ; Fathi, M. ; Abou Zead, M.Y. ; Mesalhy, S. 2009.

Effect of garlic and yeast in the culture of Nile tilapia *(Oreochromis niloticus).* Abbassa International Journal for Aquaculture. Special issue for Global Fisheries and Aquaculture Research Conference, Cairo International Convention Center, 24-26 Oct 2009. p. 453-465.

This study aimed to examine the effect of inulin and vitamin C as probiotic on the growth, survival, and immunomodulation of the cultured Nile tilapia (*Oreochromis niloticus*), besides their possible protective effects against a challenge infection using *A. hydrophila*.
Mahound, M.A. ; Mesalhy, S. ; John, G. 2009.

The role of ornamental goldfish *Carassius auratus* in transfer of some viruses and ectoparasites to cultured fish in Egypt: comparative ultra-pathological studies. African Journal of Aquatic Science 34(2):.

Goldfish, common carp and Nile tilapia were sampled between September 2002 and May 2003 to investigate lesions induced by viral diseases and ectoparasites. Goldfish exhibited neoplasms, *Dermocystidium sp*., *Ichthyophthirius multifiliis* (Ich), *Trichodina reticulata*, *Lernaea cyprinacea* and systemic infections. Neoplastic and systemic infections in goldfish were associated with viral infection. *Oreochromis niloticus* and *Cyprinus carpio* were mainly infested with several species of *Trichodina* and monogeneans. The presence of *Dermocystidium sp.* in carp, and viral particles in the liver and spleen of *O. niloticus* and *C. carpio*, was uncommon. Microscopically, intracytoplasmic inclusion bodies in the hepatic cells and lymphocytic infiltration in other internal organs of the three fish species were seen. Ultrastructural study showed enveloped viral particles in some cells in all fish species. The recorded parasitic infections were associated with degenerative, necrotic, inflammatory and proliferative changes in the skin and underlying muscles. Imported ornamental goldfish may be a source of infection to carp and native tilapia. Histopathology and transmission electron microscopy demonstrated the etiology and pathogenesis of infection and the preliminary diagnosis of viral infection, which is not common in Egypt. It is recommended that goldfish be excluded from edible-fish aquaculture ponds. Strict regulations regarding the transfer and quarantine of imported fish should be implemented.

Massin, C. ; Uthicke, S. ; Purcell, S.W. ; Rowe, F.W.E. ; Samyn, Y. 2009.

Taxonomy of the heavily exploited Indo-Pacific sandfish complex *(Echinodermata: Holothuriidae)*. Zoological Journal of the Linnean Society 155:40-59.

Two commercially valuable holothurians, the sandfish and golden sandfish, vary in colour and have a confused taxonomy, lending uncertainty to species identifications. A recent molecular study showed that the putative variety *Holothuria (Metriatyla) scabra var. versicolor Conand, 1986* ('golden sandfish') is a distinct species from, but could hybridize with, *H. (Metriatyla) scabra Jaeger, 1833* ('sandfish'). Examination of the skeletal elements and external morphology of these species corroborates these findings. The identity of *H. (M.) scabra* is unambiguously defined through the erection and description of a neotype, and several synonyms have been critically re-examined. The nomenclaturally rejected taxon *H. (Metriatyla) timama* Lesson, 1830 and *H. (M.) scabra* var. versicolor (a nomen nudum) are herein recognized as conspecific and are allocated to a new species, *Holothuria lessoni sp. nov.*, for

which type specimens are described. The holotype and only known specimen of *H. aculeata Semper, 1867*, has been found and is redescribed. It is considered to be a valid species. Taxonomic clarification of this heavily exploited species complex should aid its conservation and permit species-specific management of their fisheries.

Megahed, M.E. ; Mesalhy, S. 2009.

Artificial feed and feed technology for marine finfish and shellfish larvae: a review. Abbassa International Journal for Aquaculture. Special issue for Global Fisheries & Aquaculture Research Conference, Cairo International Convention Center, 24-26 Oct 2008 p. 647-663.

Successful larval culture of most marine finfish and shellfish species still depends on live feeds, such as rotifers and Artemia. However, live feeds are expensive to produce and are often of variable quality and accounting for a significant proportion of the total operational costs of hatcheries. Furthermore, crashes of cultures due to bacteria or viral infections can result in interrupted supplies of live feeds and increase disease risks for cultured organisms. This article focuses on 1) The recent developments in both industry and research related to feeds and feed technologies in marine hatcheries; 2) The current status and advances of hatchery feeds, technologies in commercial hatcheries; 3) The priorities for research and development needs in the area of marine hatcheries.

Megahed, M.E. ; Mesalhy, S. 2009.

Challenges facing marine aquaculture and requirements for development in Egypt. Abbassa International Journal for Aquaculture. Special issue for Global Fisheries & Aquaculture Research Conference, Cairo International Convention Center, 24-26 Oct 2008 p. 505-527.

Aquaculture plays a vital role as an alternative source of income for coastal fishery communities as it contribute in reducing the pressure on marine natural resources and recently is considered as an important sector for supporting rural economic development. It is expected to show growth in the marine sector in Egypt, and the success of individual operations will depend on the successful application of a variety of multidisciplinary activities. Economic viability must be linked to better marketing strategies and food safety, transparency, traceability, quality, and sustainability issues are at the forefront of Egyptian concerns and actions. Technical improvements are expected to continue to improve cost efficiency and stimulate further species diversification at a time when fisheries production is stagnant and in certain sectors in decline. Simplified legislations and licensing procedures have been

called and continued as well as coherent policies for research and development is essential. This paper focuses on the challenges facing the mariculture development in Egypt and the requested approaches to treat these challenges and improve this industry.

Megahed, M.E. ; Mesalhy, S. 2009.

Domestication and species diversification to improve marine aquaculture in Egypt (a prospective view). Abbassa International Journal for Aquaculture. Special issue for Global Fisheries & Aquaculture Research Conference, Cairo International Convention Center, 24-26 Oct 2008 p. 529-546.

The expected more interest of marine aquaculture projects in Egypt will increase the demands of marine seed production for a variety of species. The limited and inconsistent availability of wild finfish and shellfish larvae together with an urgent need of establishing selective breeding programs increased the interest in captive reproduction of finfish and shellfish worldwide. The selection of a species suitable for Egyptian marine aquaculture depends primarily on its marketing value, biology and the ability to produce juveniles in significant numbers for commercial production. The development of domestication program in Egypt is promising technology given that Egypt has the suitable site with the correct environmental conditions for marine aquaculture. This paper is discussing the required elements to support domestication and species diversification to improve mariculture industry in Egypt.

Mesalhy, S. 2009.

Probiotics and aquaculture. CAB Reviews: perspectives in agriculture, veterinary science, nutrition and natural resources 4:74.

Aquaculture has become the fastest growing sector of food production in the world. Despite the encouraging trends, several constraints have a negative impact on the growth of aquaculture. Among those, diseases are the primary limiting factors. Bacterial diseases are responsible for heavy mortality in both wild and cultured fish. Antibiotics are used to control such infection but may result in development and spread of antimicrobial-resistant bacteria and resistance genes and occurrence of antimicrobial residues in fish tissues. This may induce a negative impact on human health, fish performance and the environment. An alternative approach employed recently to control bacterial infection in fish is the use of vaccines. However, vaccines are not available in many countries, a tremendous amount of human labour is required to deliver the vaccines, and implementation is also associated with

handling stress for the fish, which may impair the efficacy of the vaccines to a great extent. The concept of biological disease control, particularly using nonpathogenic biological agents (probiotics), has received widespread attention during the last decade. This review focused on the nature, sources, benefit, selection criteria, mode of action and efficiency of probiotics.

Mesalhy, S. ; Atti, N.M.A. ; Mohamed, M.F. 2009.

Effect of pond supplemented with chicken manure on bacterial build up and its antimicrobial resistance, besides the quality and shelf-life of cultured Nile tilapia *(Oreochromis niloticus).* p. 317-339. In: Balal, S.E (ed.) Proceedings of The 6th International Scientific Conference, Faculty of Veterinary Medicine, El Mansoura University, Egypt). El Mansoura, Egypt: El Mansoura University.

Twelve thousand fries of Nile Tilapia (*Oreochromas niloticus*) were stocked in 6 ponds, three ponds were supplemented with chicken-manure and others with artificial diet. The Aeromonas. and *Pseudomonas spps*. were isolated from all ponds while the *Salmonella* and *Enterococcus spps.* were isolated from the manure supplemented ponds. As a General observation, the antimicrobial resistance of the isolated bacteria was high with oxytetracyclin, low with ciprofloxacin. The *Pseudomonas spp.* seemed to be the highest resistant to the used antimicrobials, while the *Enterococcus spp.* was the lowest. The total psychrotrophic counts / g of fish-flesh, collected from the fish of manure supplemented pond, showed significantly higher mean value than that of fish supplemented with artificial diet. The psychrotrophic strains were isolated from all ponds with varied frequency and percentage at both 0 time and after 168 h of ice storage, however, Coliform, *Enterococcus spp.*, *Flavobacterium spp.*, *Staphylococcal spp.* and *Moraxella spp.* were only isolated from fish-flesh samples from manure supplemented ponds. It could be concluded that, using of the chicken manure supplement for aquaculture may transfer some food-borne or zoonotic bacteria to the aquaculture and consequently to the consumer. Moreover, may create multidrug- resistant bacterial strains and decrease the fish quality and shelf-life.

Mesalhy, S. ; Megahed, M.E. 2009.

Health management in marine fish and shrimp hatcheries with special reference to immunostimulants (an overview). Abbassa International Journal for Aquaculture. Special issue for Global Fisheries & Aquaculture Research Conference, Cairo International Convention Center, 24-26 Oct 2008 p. 574-569.

Egyptian Government expresses efforts to provide aquaculture industry with high

quality fish and to prevent diseases outbreak. The production of larvae and fry is still unpredictable for some species, owing to the lack of control of the microbiota in the rearing systems. Using conventional approaches such as the use of disinfectants and antimicrobial drugs, have had limited success in the prevention or cure of aquatic disease. Also, use of antibiotics does not constitute a sustainable solution, and may result in microflora imbalance for the larvae. Better means for disease prevention and control will be easy through the development of intensive aquaculture production systems. In order to prevent the proliferation and spread of opportunistic pathogens. Further progress upon an efficient microbial control, particularly in the production of larvae and during on-growth in required. Immunostimulants are currently known as alternative strategies to the use of antimicrobials in disease control and have already been proposed and applied successfully in aquaculture. This paper will focus on the use of immunostimulants as a health management tool to control diseases in marine fish and shrimp hatcheries.

Mesalhy, S. ; Megahed, M.E. 2009.

Improving disease resistance of cultured fish through selective programs (an overview). Abbassa International Journal for Aquaculture. Special issue for Global Fisheries & Aquaculture Research Conference, Cairo International Convention Center, 24-26 Oct 2008 p. 387-405.

The sustainable development of aquaculture in Egypt needs the efforts coordinated of different sectors. Disease prevention is the most important aspect for protecting the success in the field of aquaculture. Egyptian farmers, like other farmers in other countries, use different chemicals and antibiotics to treat fish diseases. This approach is dangerous to aquaculture because of the residue in fish body and also for the development of drug resistant bacteria that not only affect fish but also induce harmful effect on humans and may have a deteriorative effect on the environment. Development of selective breeding research is important to improve disease resistance in Egypt. This paper is focusing on effort that done in this regard.

Mesalhy, S. ; Taha, R.M. ; El-Bhar, S.M. 2009.

The effect of stocking density on some biochemical parameters of Oreochromis niloticus reared in different stocking densities. Suez Canal Veterinary Medicine Journal 14(1): 101-110.

Probiotics are widely used in poultry and swine rearing farms but little has been done to incorporate them into aquaculture. This study aimed to pathologically and immunologically evaluate the efficiency of *Bacillus subtilis* and/or *Lactobacillus acidophilus* as a potential probiotic in the culture of Nile tilapia (*Oreochromis*

niloticus).

Mills, D. ; Béné, C. ; Ovie, S. ; Tafida, A. ; Sinaba, F. ; Kodio, A. ; Russell, A. ; Andrew, N. ; Morand, P. ; Lemoalle, J. 2009.

Vulnerability in African small-scale fishing communities. Journal of International Development (online).

Fishing communities are often recognised as being amongst the poorest in developing countries, and interventions targeted at improving resource status seen as central in the fight against poverty. A series of field assessments focusing on vulnerability conducted in two communities in Mali and Nigeria revealed some counterintuitive results. Despite fishing being the primary livelihood, vulnerabilities relating directly to the state of the resource were ranked lower than those relating to basic human needs. Those results challenge the conventional view and suggest that non-sectoral interventions can have more effective impacts on the livelihood of those communities than interventions targeting the resources.

Murshed-e-Jalan, K. ; Ahmed, M. ; Belton, B. 2009.

The impacts of aquaculture development on food security: lessons from Bangladesh. Aquaculture Research [online].

Fish contribute a significant amount of animal protein to the diets of people in Bangladesh, about 63% of which comes from aquatic animals. In Bangladesh, fish is mainly derived from two sources: capture and culture. Aquaculture has shown tremendous growth in the last two decades, exhibiting by about 10% average annual growth in production. Capture fisheries, although still the major source of supply of fish, have become static or are in decline due to over- fishing and environmental degradation, and it is now believed that aquaculture has the greatest potential to meet the growing demand for fish from the increasing population. At present, aquaculture production accounts for about one-third of the total fish production in Bangladesh. This paper examines the impact of an aquaculture development project in Bangladesh on food security, with particular emphasis on the poor. The analysis shows a positive impact of aquaculture development on employment, income and consumption. A number of implications for policy in areas that might strengthen these outcomes are discussed and recommendations are presented.

Murshed-e-Jalan, K. ; Salayo, N.D. ; Kanagaratnam, U. 2009.

Managing fisheries conflicts through communication planning: experience from inland fisheries of Bangladesh. Fisheries Research 99: 112-122.

Increasing population, ineffective management, competition among fishing gears over access to resources and proliferation of destructive practices are imposing severe stress on the inland water bodies of Bangladesh. These factors also contribute to the increasing incidence of conflicts among fishery stakeholders. When unabated, these conflicts are potential threats to the livelihoods of millions of the poorest fishing communities that depend on these resources. Effective communication between conflicting parties is perceived as a key for establishing successful negotiations for managing conflicts. On this premise, this paper presents and assesses a Fisheries Conflicts Communication Framework, henceforth called FishCom, a tool for developing plans and strategies for managing fisheries conflicts in the inland fisheries of Bangladesh. This tool embodies a structured participatory process intended for use by policy-makers and conflict management practitioners. They have important roles in catalyzing and effecting changes that are instrumental in minimizing, if not totally eliminating conflicts. Experiences from applying FishCom in the inland fisheries study sites in Bangladesh show that it has enabled a systematic stakeholder-inclusive identification and evaluation of fisheries conflicts and planning of communication interventions to manage them.

Mustafa, M.G. 2009.

Fishery resources trends and community-based management approahes adopted in the river Titas in Bangladesh. International Journal of River Basin Management 7(2):135-145.

During 1997–2002, a Community Based Fisheries Management (CBFM) project was implemented to monitor fish catches in two sections of the River Titas (Goshipur to Gokornaghat section and Ka section), an important tributary of the Meghna River in Bangladesh and the lower Indo-Gangetic Plains. The study covered fishing activities, fisher's participation in managing fishery resources, gear-diversification, changes in fishing patterns, and overall catch and effort. Fish catch monitoring results showed that production and species diversity increased over the duration of the project, due to the community management approach, which encourages participation of fishers, beneficiaries and communities in managing the renewable fishery resources. The study revealed that during 1997 to 2002 annual fish production increased by 233% and 15% in the two river sections, respectively. Overall species diversity increased by 30% in the river in 2002 compared to the baseline composition. However, overexploitation was observed in the Ka section of the river where professional fishers and catch through fish aggregating devices prevail.

Mustafa, M.G. ; Brooks, A.C. 2009.

A comparative study of two seasonal floodplain aquaculture systems in Bangladesh. Water Policy 11(S1):69-79.

This paper presents a comparative analysis of the technical and economic parameters of two community led approaches: the semi-closed water bodies and the floodplain water bodies based systems in Bangladesh. The two approaches differ in management, fish production, impact on biodiversity, capital investment and annual variable costs, share of profits and proportional benefits for the poor, and impact on allied businesses—the so-called backward and forward linkages. For the semi-closed water bodies (beels) the fish harvest increased from an annual average of 380 kg ha-1 in 2002 to 921 kg ha-1 by 2005. During the same period, the biodiversity measured for self-recruiting indigenous species, using the Shannon-Weiner Index (H′), increased significantly ($P<0.05$) from 2.24 in 2002 to 2.56 in 2005. For the floodplain aquaculture system (Pankowri or Daudkandi model) annual fish production ranged from 1.5 to 1.8 t ha-1. Annual net economic benefit per hectare was found to be Taka 37,710±24,600 and 26,819±10,780 for semi-closed and floodplain systems respectively. The net income per kg of product was found to be Taka 44.0±9.0 and 13.0±3.0 for semi-closed and floodplain systems, respectively. The floodplain system tends to use comparatively more feed and fertilizers per unit area that pond-based aquaculture.

Nagabhatla, N. (Contributor). 2009.

Mountain GIS: promoting geographic information and earth observation applications for the sustainable development of the Hindu Kush-Himalayan region. Conference of the Mountain Forum and ICIMOD. 14-28 Jan 2008. Nepal, The Mountain Forum Secretariat. 60 p.

The Hindu Kush-Himalayan (HKH) region, home to the largest concentration of glaciers outside of the polar region, is the ‘water-tower’ of Asia. The HKH mountain ecosystem provides life support services to almost a third of humanity. Many mountain issues such as management of water resources, climate change, biodiversity conservation and hazard mitigation are interconnected in nature and, therefore, need to be considered holistically. The relevance of geographic information (GI) and earth observation (EO) applications in supporting decision-making is being increasingly realised by technical experts, practitioners and policy makers. There is a growing need for generating spatial and temporal data to aid planning, management and policy formulation in the mountain context.

Nagabhatla, N. ; Pattnaik, C. ; Sellamuttu, S.S. ; Prasad, S.N. ; Wickramasuriya, R. ; Finlayson, M. 2009.

Investigation of aquaculture dynamics in a Ramsar site using earth observation systems in conjunction with a socio-economic assessment. Lakes & Reservoirs: Research and Management 14:325-336.

This study presents a comprehensive site-scale analysis conducted within the global wetland inventory and mapping (GWIM) project. GWIM was developed and promoted by the International Water Management Institute (IWMI) through global partnerships to investigate wetland analyses at multiple scales. The present study investigates the complexity of an inland freshwater wetland system, presenting a conceptual framework for mapping and monitoring the dynamics of Lake Kolleru (a wetland of international importance, as defined by the Ramsar Convention), utilizing a geospatial platform. Illustrating the pace of land use changes leading to the progressive elimination of the wetland ecosystem of freshwater Lake Kolleru, this study also highlights the impacts of such changes on the socio-economic system.

Nagabhatla, N. ; Prasad, P.R.C. ; Roy, P.S. 2009.

Community pattern assessment for grassland ecosystem in Nicobar Islands: South Asia Nepal Journal of Forestry XIII(I): 1-11

Nagabhatla, N. ; Wickramasuriya, R. ; Prasad, S.N. 2009.

From global to local: testing the potential of cross-scaling in global data sets. Journal of the Indian Society of Remote Sensing 37(3):443-455.

The present study investigates the potential of readily available and easily accessible global data sets to understand regional/local level interactions in wetland systems. The biogeographical zones of India were used a base-frame to select three sites. The study well fits the interests of National Wetland Committee of India to investigate and document fundamental information on wetland extent/distribution. The national partnership with SACON represents this interest. Global data SACON commenced the inland wetland inventory module at national scale using geospatial data, although the provincial scale analysis is underway. In addition, the global irrigated area mapping (GIAM-IWMI) project generated multi-scalar spatial outputs for irrigated/ rain-fed areas. With the existing information base, a multi-level geospatial analysis using Arc GIS algorithmic modelling was used to derive comprehensive appraisal of wetland systems complementing the data from GIAM and SACON. It was observed that the overlap between the two layers was 58 percent for Gujarat and 10 percent in Tamil Nadu. In Krishna basin the wetland's cover 1.04 million hectare excluding the rice agro-ecosystem. The difference in the biogeography of the case sites

governs the gradient of information derived from both data layers. Additionally, the global lakes and wetlands database (GLWD) database added thematic information on coastal wetlands. In summary we describe the cross-scaling the global data layers to compliment the regional/national level monitoring assignments.

Na-Nakorn, U. ; Brummett, R.E. 2009.

Use and exchange of aquatic genetic resources for food and aquaculture: clarias catfish. Reviews in Aquaculture 1(3/4): 214-223.

There are 58 species of Clarias recognized in FishBase (as of January 2009), 33 in Africa and 25 in Asia. Aquaculture of clariids is important with 30 countries reporting a total production of over 300 000 t worth nearly US$400 million in 2006. Most production involves the African *Clarias gariepinus* (Burchell, 1822) and three Asian species, *Clarias batrachus* (Linnaeus, 1758), *Clarias macrocephalus* (Günther, 1864) and *Clarias fuscus* (Lacep'de, 1803). In much of Asia, hybrids of introduced *C. gariepinus* with native species dominate aquaculture and may pose threats to the purity and viability of wild populations. Many local strains have evolved within farms, some of which have been described and included in genetic management programs. Genetic variation among species and populations is significant, but to date little work on selective breeding of the group has been reported. Conservation efforts have so far focused on ex situ methods, primarily for farmed stocks, but these are few and expensive and farmed stocks are often of lower genetic diversity than wild stocks. In situ conservation of genetic material, both for aquaculture and for the maintenance of fitness in wild populations in light of changes occurring in the watershed, needs to be considered as a more viable long-term strategy. The preservation of ecosystem functional integrity is thus a prerequisite for the long-term conservation of Clarias genetic resources for food and aquaculture.

Nguyen, N.H. ; Pongthana, N. ; Ponzoni, R.W. 2009.

Heterosis, direct and maternal genetic effects on body traits in a complete diallel cross involving four strains of red tilapia *Oreochromis spp.* Proceedings of the 18th Conference of the Association for the Advancement of Animal Breeding and Genetics. 28 Sept-1 Oct 2009, Brossa Valley, South Australia. 18:358-361.

Heterosis, direct additive genetic and general reciprocal effects were estimated from a complete diallel cross involving four strains of red tilapia *Oreochromis spp* from Malaysia, Stirling, Taiwan and Thailand. The mating involved 16 parental female and male breeders per strain, producing 64 full sib families in total, with four full-sib families per cross. Statistical analyses were carried out on 1280 performance

records collected in both fresh water (0 ppt) and saline water (30 ppt) environments. There was a large additive genetic component for body traits in the four strains of red tilapia. The Malaysian strain was the best (7.4% above the overall mean of the pure strains), whereas the strain from Stirling had the poorest additive performance (13.4% below the overall mean of the pure strains). The average heterosis for body weight across the testing environments was low (4.2%) and the average of all crossbreds was not statistically different from the mean of pure strains. Ranking of strains based on estimates of reciprocal effects was generally similar to that of additive genetic effects. Strategies for the future breeding program in red tilapia are discussed.

Njock, J.C. ; Allison, E.H. ; Westlund, L. ; Konan, A. 2009.
Innovations in fisheries co-management, and the challenge of mobility p. 267-279. In: Wramner P., M. Cullberg and H. Ackefors (eds.) Fisheries, sustainability and development. Royal Swedish Academy of Agriculture and Forestry, Stockholm.

Co-management attempts mostly focus on improving fish-stock management, requiring people to reduce fishing activities, without offering any interim benefits. Thus incentives are not taken into account. The SFLP (Sustainable Fisheries Livelihood Programme, FAO) approach to co-management was instead based on embedding fisheries management in a development context, recognising that local institutions for resource management could also be used to mobilise finance and services in support of fishing communities. It gives priority to an enabling legal framework and appropriate institutions

Nouh, W.G. ; Mohamed, M.F. ; Mesalhy, S. 2009.
Pathological evaluation to the effect of some probiotics on the health and immune status of Nile tilapia (*Oreochromis niloticus***).** Egypt Journal of Comparative Pathology and Clinical Pathology 22(2): 233-249.

Probiotics are widely used in poultry and swine rearing farms but little has been done to incorporate them into aquaculture. This study aimed to pathologically and immunologically evaluate the efficiency of Bacillus subtilis and/or Lactobacillus acidophilus as a potential probiotic in the culture of Nile tilapia (*Oreochromis niloticus*).

Oliver, J.K. ; Berkelmans, R. ; Eakin, C.M. 2009.

Coral bleaching in space and time. p. 21-37. In: van Oppen, M.J.H. and J.M. Lough (eds.). Coral bleaching: patterns, causes and consequences. Ecological Studies 205, Springer-Verlag, 2009.

One of the most dire consequences of global climate change for coral reefs is the increased frequency and severity of mass coral bleaching events. This chapter looks at the spatial and temporal patterns of coral bleaching that can be detected in the Reefbase global database of bleaching records.

Phillips, M.J. ; Enyuan, F. ; Gavine, F. ; Hooi, T.K. ; Kutty, M.N. ; Lopez, N.A. ; Mungkung, R. ; Nagan, T.T. ; White, P.G. ; Yamamoto, K. ; Yokoyama, H. 2009.

Review of environmental impact assessment and monitoring in aquaculture in Asia-Pacific. p. 153-283. In: FAO. Environmental impact assessment and monitoring in aquaculture. FAO fisheries and aquaculture technical paper No. 527. Rome, FAO.

This review is prepared as part of the FAO Project "Environmental Impact Assessment (EIA) and monitoring in aquaculture". The review provides a compilation, review and synthesis of existing EIA and environmental monitoring procedures and practices in aquaculture in the Asia-Pacific region, the largest aquaculture-producing region in the world. This review, as in other regions, gives special consideration to four areas related to EIA and monitoring in aquaculture including: (1) the requirements (2) the practice (3) the effectiveness and (4) suggestions for improvements. Australia, China, India, Indonesia, Japan, Malaysia, the Philippines, Thailand and Viet Nam are covered in some depth, and a brief overview is provided of EIA and monitoring in several other countries in the region that are in various stages of adoption and implementation of environmental impact assessment, monitoring and other environmental management measures for aquaculture.

Pillai, B.R. ; Sahoo, L. ; Das Mahapatra, K. ; Ponzoni, R. ; Sahu, S. ; Mohanty, S. ; Vijaykumar ; Sahu, S. 2009.

Evaluation of the new fluorescent internal tag (soft visible implant alphanumeric tag) in the freshwater prawn, *Macrobrachium rosenbergii.* The Israeli Journal of Aquaculture - Bamidgeh 61(4): 345-350.

The new version of the polyester visible implant alphanumeric tag (VI Alpha tag; Northwest Marine Technology Inc., Shaw Island, Washington, USA) was evaluated in the giant river prawn (*Macrobrachium rosenbergii*) under laboratory conditions. The new VI Alpha tag is soft and fluorescent with an alphanumeric code designed

to identify individual specimens. Two tag sizes - standard (1.0 x 2.5 mm) and large (1.5 x 3.5 mm) - were tested on juveniles (standard size), subadults (standard size), and adults (large size) for 10 weeks. Retention, readability, and effects on growth and survival were evaluated. Final mean tag retention was 71.25±3.3% in juvenile prawns, 91.3%±2.73 in subadult prawns, and 59.0%±1.65 in adult prawns. Final tag readability was 100.0% in juveniles, 88.6±5.3 in subadults, and 77.8±4.8 in adults. Average daily growth (mg/day) and SGR (%/day) of tagged juvenile prawns (22.4±0.23 and 0.81±0.02, respectively) did not significantly differ ($p>0.05$) from that of the untagged control (20.5±1.47 and 0.83±0.04). Similar results were observed in subadult and adult *M. rosenbergii*. Mean final survival did not significantly differ ($p>0.05$) between tagged and untagged prawns. Results indicate that tagging *M. rosenbergii* with VI Alpha tags has no adverse effect on survival or growth and can therefore be effectively used to identify individuals in selective breeding programs.

Pomeroy, R. ; Nguyen, K.A.T. ; Thong, H.X. 2009.

Small-scale marine fisheries policy in Vietnam. Marine Policy 33:419-428.

Vietnam's marine fisheries are considered to be small scale and are concentrated in coastal near-shore waters. This has resulted in heavy pressure on near-shore fisheries resources. Near-shore fisheries are considered by fishers and the government to be over-exploited, causing hardship for many coastal communities. This paper reviews and analyzes changes in policy towards small-scale fisheries in Vietnam over the last two decades. The primary issues facing the small-scale fisheries in Vietnam are to restructure the near-shore fisheries and to address over-capacity. Recommended actions include improved fisheries statistics, resources for provincial fisheries staff, and a coordinated and integrated approach involving a mixed strategy of resource management; resource restoration; economic and community development; and new governance arrangements.

Ponzoni, R.W. ; Nguyen, N.H. ; Khaw, H.L. 2009.

Genetic improvement programs for aquaculture species in developing countries: prospects and challenges. Proceedings of the 18th Conference of the Association for the Advancement of Animal Breeding and Genetics. 28 Sept-1 Oct 2009, Brossa Valley, South Australia. 18:342-249.

Aquaculture in developing countries is largely based on unimproved fish strains. There is ample evidence indicating the potential of genetic improvement programs and a range of selection methods may be used. Examples of the application of mass, cohort, within family, and combined between-within family are given. The

methods are discussed in terms of their effectiveness and suitability. It is concluded that in principle all the methods can work well, provided the selection program is started with a population with a broad genetic base and that during its conduct a balance is struck between selection intensity and containment of inbreeding. Limitations to the implementation of genetic improvement programs and the challenges they face are discussed.

Purcell, S.W. ; Blockmans, B.F. 2009.

Effective fluorochrome marking of juvenile sea cucumbers for sea ranching and restocking. Aquaculture 296(3/4): 263-270.

Marking of skeletal body parts of marine animals with fluorochromes, such as tetracycline and calcein, can provide a valuable tool for mark-recapture studies. In recent decades, both fluorochromes have been used extensively for marking marine animals, including fish, mollusks, echinoderms and nemertean worms In this study, the authors examine protocols for administering tetracycline and calcein asmarkers for juvenile sea cucumbers.Wefocus on themost economically valuable of tropical species, the 'sandfish' *Holothuria scabra* Jaeger 1833, which is well suited to restocking and sea ranching. Experiments in tanks compared the efficacy of marking spicules and both lethal and non-lethal effects among different concentrations, durations and temperatures of immersion marking. Preliminary investigations of three additional fluorochromes, alizarin complexone, calcein blue and xylenol orange were also conducted to see if these would also mark spicules and potentially provide many dichromic marking combinations.

Rama Chandra Prasad, P. ; Sringeswara, A.N. ; Sudhakar Reddy, Ch. ; Nagabhatla, N. ; Rajan, K.S. ; Giriraj, A. ; Murthy, M.S.R. ; Raza, S.H. ; Dutt, C.B.S. 2009.

Assessment of forest fragmentation and species diversity in North Andaman Islands (India): a geospatial approach. International Journal of Ecology and Development 14(F09) [online].

The present study was carried out in the context of conservation biology research, focusing on the species diversity in the fragmented landscapes of island ecosystem. The study analyzed the levels of forest fragmentation and its effect on species diversity in the North Andaman Islands using satellite remote sensing data and a GIS-based fragmentation model in conjunction with phyto-sociological analysis. Results depict that the model performed well when the forest is considered as a single unit, compared to the scenario wherein the individual forest types are accounted. Additionally, the phyto-sociological data analysis results are correlated with the fragmentation model, which indicates that majority of the area is under

intact category, contemplating that the process of fragmentation in these islands is in its initial phase.

Rebelo, L.M. ; Finlayson, C.M. ; Nagabhatla, N. 2009.
Remote sensing and GIS for wetland inventory, mapping and change analysis. Journal of Environmental Management 90(7): 2144-2153.

A multiple purpose wetland inventory is being developed and promoted through partnerships and specific analyses at different scales in response to past uncertainties and gaps in inventory coverage. A partnership approach is being promoted through the Ramsar Convention on Wetlands to enable a global inventory database to be compiled from individual projects and analyses using remote sensing and GIS. Individual projects that are currently part of this global effort are described. They include an analysis of the Ramsar sites' database to map the distribution of Ramsar sites across global ecoregions and to identify regions and wetland types that are under-represented in the database. Given the extent of wetland degradation globally, largely due to agricultural activities, specific attention is directed towards the usefulness of Earth Observation in providing information that can be used to more effectively manage wetlands. As an example, a further project using satellite data and GIS to quantify the condition of wetlands along the western coastline of Sri Lanka is described and trends in land use due to changes in agriculture, sedimentation and settlement patterns are outlined. At a regional scale, a project to map and assess, using remote sensing, individual wetlands used for agriculture in eight countries in southern Africa is also described. Land cover and the extent of inundation at each site is being determined from a multi-temporal data set of images as a base for further assessment of land use change. Integrated fully within these analyses is the development of local capacity to plan and undertake such analyses and in particular to relate the outcomes to wetland management and to compile data on the distribution, extent and condition of wetlands globally.

Rezk, M.A. ; Ponzoni, R.W. ; Khaw, H.L. ; Kamel, E. ; Dawood, T. ; John, G. 2009.
Selective breeding for increased body weight in a synthetic breed of Egytian Nile tilapia, *Oreochromis niloticus*: response to selection and genetic parameters. Aquaculture 293: 187-194.

Selection for harvest weight was performed in a fully pedigreed synthetic line of Nile tilapia (*Oreochromis niloticus*) in Egypt for two generations. Records were available over three spawning seasons (2002, 2003 and 2004) for weight at the beginning of communal rearing (initial weight), harvest weight and survival rate. The data set consisted of 9,267 progeny records from 214 sires and 323 dams. Phenotypic

and genetic parameters, as well as response to selection, were estimated fitting an animal model as well as a sire and dam model to the data. Initial and harvest weight were transformed to log10 for analysis. The heritabilities (s.e.) from the animal model for initial weight, harvest weight and survival were 0.106 (0.0576), 0.144 (0.0598) and 0.120 (0.0346), respectively, whereas the corresponding maternal and common environmental effects, c^2, were 0.652 (0.0475), 0.384 (0.0496) and 0.015 (0.0214), respectively. The genetic correlations had large standard errors, but they were in a favorable direction, especially between harvest weight and survival [0.458 (0.2035)]. Response to selection was estimated in two different ways: (i) From the difference in average breeding values between generations, and (ii) From the difference in breeding value between the selection and the control lines. Using the former method the responses in harvest weight were 6.64 and 6.96 per cent, comparing the progeny of the 2002 with 2003, and 2003 with 2004 spawnings, respectively, giving a cumulative response of about 14 percent in two generations. With the second method, the difference between the control and selection line in 2004 was 3.82 per cent. The results are discussed in relation to other selection work conducted with tilapia, and the future direction of the genetic improvement program is outlined.

Springate-Baginski, O. ; Allison, E. ; Darwall, W. 2009.

Introduction and conceptual framework. p. 1-16. In: Springate-Baginski, O.; Allen, D. and Darwall, W.R.T.(eds.) An integrated wetland assessment toolkit: a guide to good practice. IUCN, Gland, Switzerland; IUCN species programme, 144 p.

This chapter introduces the integrated approach to wetland assessment. It argues for integration as an essential principle for understanding wetlands and their management and use. It discusses different approaches for integration, and advocates a conceptual and methodological framework for assessing wetlands in a fully integrated manner.

Springate-Baginski, O. ; Allison, E. ; Emerton, L. ; Darwall, W. ; Allen, D. 2009.

How to conduct an integrated wetland assessment. p. 17-30. In: Springate-Baginski, O.; Allen, D. and Darwall, W.R.T.(eds.) An integrated wetland assessment toolkit: a guide to good practice. IUCN, Gland, Switzerland; IUCN species programme, 144 p.

This chapter provides a ‘how to’ guide for practically applying the integrated approach to a wetland assessment. It separates the assessment activities into three stages (preparation; field assessment and analysis; presentation and engagement)

and eleven component steps. It gives recommendations based on our experience of using the toolkit in the two case studies presented in Section III.

Tewfik, A. ; Mills, D. ; Adhuri, D. 2009.

Spiny lobster resources and opportunity for culture in post-tsunami Aceh, Indonesia p. 27-34. In: Williams, K.C. (ed.) Spiny lobster aquaculture in the Asia-Pacific region. Proceedings of an international symposium, Nha Trang, Vietnam, 9-10 Dec 2008. ACIAR Proceedings no. 132. Australian Centre for International Agricultural Research, Canberra. 162 p.

In an effort to facilitate the restoration of livelihoods that reduce poverty and increase community resilience2 we investigated possible responses related to the pre-existing lobster fishery as well as the potential for the development of lobster culture. These activities included the compilation of biological details on local lobster populations in support of both the management of the capture fishery and future activities of puerulus collection and grow-out. Such work adds to broader efforts that include an array of habitat (e.g. mangroves) and livelihood (e.g. crab fattening, tilapia cage culture, postharvest) restoration activities as well as support to traditional and government resource-management bodies.

Thanh, N.M. ; Ponzoni, R.W. ; Nguyen, N.H. ; Vu, N.T. ; Barnes, A. ; Mather, P.B. 2009.

Evaluation of growth performance in a diallel cross of three strains of giant freshwater prawn *(Macrobrachium rosenbergii)* in Vietnam. Aquaculture 287:75-83.

The giant freshwater prawn (*Macrobrachium rosenbergii*) is one of the most important crustacean species produced in inland aquaculture in many tropical and subtropical countries worldwide. The aim of the current study was to evaluate the growth performance of three strains of giant freshwater prawn that originated from geographically separated locations in a complete (3×3) diallel cross as a starting point for a stock improvement program for the industry in Vietnam. Crosses were established over two generations using two wild Vietnamese river populations (Dong Nai and Mekong) domesticated for the study and an introduced Hawaiian strain that had been in culture for many generations. Juveniles from nine strain combinations were produced using single-pair matings. Results after 15 weeks of grow-out in hapas showed that growth performance of the Hawaiian strain was best among the purebred strains and that certain cross combinations grew significantly faster than purebred strains. Mean body weights of specific cross combinations with Dong Nai or Mekong as dams and the introduced strain (Hawaiian) as sires were significantly

heavier than those of purebred Dong Nai or Mekong strains. While males reached heavier mean weights than females, male variation among the strains was obscured by social factors that produced different frequencies of male morphotypes (blue claw, orange claw and small males). Results suggest presence of potentially valuable heterosis and possible impact of the direction of cross. From a practical viewpoint this could be exploited upon by either, including different forms of crossbreeding, or alternatively, by creating a composite population for future selection. Potential problems and challenges encountered during the trials are discussed.

NON REFEREED PUBLICATIONS

Allison, E.H. ; Kelling, I. 2009

Fishy crimes: the social costs of poorly governed marine fisheries. Third Annual Convention of the Consortium of Non-Traditional Security Studies in Asia, Singapore, 3-4 November 2009

This paper aims to consider the additional costs, in terms of human insecurity, of governance failures and development policy neglect in fisheries. We first review what is at stake by elaborating the current and potential contributions of fisheries to human security and economic development. We then outline how fisheries are currently governed, and why governance is failing, before reviewing the consequences of governance failure for human security. We are not yet able to calculate the monetary costs of these human security risks, and therefore the benefits to be derived from improving fishery governance. We are, however, able to point to examples of clear costs to specified groups of people in the Asia-pacific region that result from poor governance of the fishery social-ecological system. We conclude with examples of promising policy responses to the challenges we identify, and thoughts on how a non-traditional security perspective could benefit the analysis of such complex societal and environmental issues.

Macfadyen, G. ; Allison, E. 2009.

Climate change, fisheries, trade and competitiveness: understanding impacts and formulating responses for Commonwealth small states. Report prepared for the Commonwealth Secretariat. 103 p.

This report focuses specifically on the likely impact of climate change on the trade and competitiveness of the fisheries sector in small developing Commonwealth States and thus contributes to bringing the fisheries sector into a more central role in policy discussion on climate change.

Purcell, S.W. ; Gossiun, H. ; Agudo, N.S. 2009.

Changes in weight and length of sea cucumbers during conversion to processed beche-de-mer: filling gaps for some exploited tropical species. SPC Beche-de-mer Information Bulletin no. 29 June: 3-6.

Converting the weights or lengths of sea cucumbers in processed forms (e.g., salted or dried) to their original (live) measurement is essential for standardising data from fishery-dependent surveys and exports. We estimated the proportionate change in length and weight, during processing stages, of several species for which published

data were lacking. The wide variation among species in the percentage of weight lost during processing emphasises that conversions should be made on a species-by-species basis. Stichopus herrmanni shrunk more in length and weight than any other species we studied. We present new estimates for Actinopyga spinea, A. palauensis, A. echinites, Holothuria lessoni, and H. whitmaei. These findings complement previous studies by filling some gaps in conversion factors for tropical species, and will allow for realistic conversions of data from fishery assessments and national exports.

OTHER KEY WORLDFISH PUBLICATIONS

Andrew, N. ; Evans, L. 2009.

Approaches and frameworks for management and research in small-scale fisheries in the developing world. The WorldFish Center working paper 1914. The WorldFish Center, Penang, Malaysia. 22 p.

Commonly adopted approaches to managing small-scale fisheries (SSFs) in developing countries do not ensure sustainability. Progress is impeded by a gap between innovative SSF research and slower-moving SSF management. The paper aims to bridge the gap by showing that the three primary bases of SSF management--ecosystem, stakeholders' rights and resilience--are mutually consistent and complementary. It nominates the ecosystem approach as an appropriate starting point because it is established in national and international law and policy. Within this approach, the emerging resilience perspective and associated concepts of adaptive management and institutional learning can move management beyond traditional control and resource-use optimization, which largely ignore the different expectations of stakeholders; the complexity of ecosystem dynamics; and how ecological, social, political and economic subsystems are linked. Integrating a rights-based perspective helps balance the ecological bias of ecosystem-based and resilience approaches. The paper introduces three management implementation frameworks that can lend structure and order to research and management regardless of the management approach chosen. Finally, it outlines possible research approaches to overcome the heretofore limited capacity of fishery research to integrate across ecological, social and economic dimensions and so better serve the management objective of avoiding fishery failure by nurturing and preserving the ecological, social and institutional attributes that enable it to renew and reorganize itself.

Bakunda, A. 2009.

Report on stakeholders start-up meeting Kiyindi landing site, Mukono district, Uganda 6 June 2008. Workshop report. The WorldFish Center Project Report 1962. Penang, Malaysia. 12 p.

The WorldFish Center and FAO are implementing a regional programme entitled "Fisheries and HIV/AIDS in Africa; investing in sustainable solutions", funded by the Swedish International Development Cooperation Agency (Sida) and the Norwegian Ministry of Foreign Affairs. As part of this project, the Department of Fisheries Resources, Uganda will provide the institutional support through organizing three stakeholders meetings and this report is the result of the first meeting held.

Banda-Nyirenda, D. ; Hüsken, S.M.C. ; Kaunda, W. 2009.

Impact of nutrition and fish supplementation on the response to anti retroviral therapy, Zambia: a literature review. The WorldFish Center Project Report 1985. Penang, Malaysia. 25 p.

This work is part of the Regional Programme Fisheries and HIV/AIDS in Africa: Investing in Sustainable Solutions, implemented by the WorldFish Center and funded by the Swedish International Development Cooperation Agency (Sida) and the Norwegian Ministry of Foreign Affairs. The research study analyses the effects of a fish supplemented diet on HIV/AIDS patients' response to Anti Retroviral Treatment (ART). This literature review forms the background and basis for the clinical research to be undertaken in selected The Kenneth Kaunda Children of Africa Foundation (KKCAF) centers in Zambia.

Béné, C. ; Abban, E.K. ; van Zwieten, P. ; Dankwa, H.R. ; Brummett, R. ; Ofori, J.K.; Obirih-Opareh, N. ; Kolding, J. 2009.

Engaging local communities in aquatic resources research and activities: a technical manual. The WorldFish Center technical manual no.1951. The WorldFish Center, Penang, Malaysia. 23 p.

This document is part of a series of 5 technical manuals produced by the Challenge Program Project CP34 "Improved fisheries productivity and management in tropical reservoirs". The objective of this technical manual is to relay the field experience of a group of scientists who have worked extensively in small fisheries in sub-Sahara Africa and Asia and lay out a series of simple and pragmatic pointers on how to establish and run initiatives for community catch assessment. The manual relies in particular on practical experience gained implementing Project 34 of the Challenge Programme on Water and Food: Improved Fisheries Productivity and Management in Tropical Reservoirs.

Chilima, D.M. 2009.

Democratic Republic of the Congo planning meeting, 5-6 Dec 2007. Workshop report. The WorldFish Center Project Report 1961. Penang, Malaysia. 14 p.

The WorldFish Center and FAO are implementing a regional programme entitled "Fisheries and HIV/AIDS in Africa; investing in sustainable solutions", funded by the Swedish International Development Cooperation Agency (Sida) and the Norwegian Ministry of Foreign Affairs. In DR Congo, the main project site is Kasenga area situated in Katanga Province. The Department of Fisheries and National AIDS

Council are the main stakeholders who will utilize the results of the research to influence policy. Research institutions and NGOs will implement the research and pilot interventions in the Katanga Province as agreed during the workshop. The Workshop objectives are 1) To agree on the research focus for the DR Congo component within the overall project framework 2) To develop a detailed annual work plan for 2008, and an overall work plan to the end of the project in March 2010 3) As part of these work plans, to agree on milestones, deliverables and identify indicators 4) To identify linkages with related projects and agree how these linkages will be managed.

Chilima, D.M. 2009.

Zambia planning meeting, 8-9 Nov 2007. Workshop report. The WorldFish Center Project Report 1960. Penang, Malaysia. 10 p.

The WorldFish Center and FAO are implementing a regional programme entitled "Fisheries and HIV/AIDS in Africa; investing in sustainable solutions", funded by the Swedish International Development Cooperation Agency (Sida) and the Norwegian Ministry of Foreign Affairs. In Zambia, the main project site is Kafue flats. The Department of Fisheries (DOF) and National AIDS Council (NAC) are the main stakeholders who will utilize the results of the research to influence policy. Research institutions and NGOs will implement the research and pilot interventions in the designated project sites. The objectives of the workshop are to: 1) Create a shared understanding of programme objectives and processes 2) Develop an understanding of the technical programme focus and approaches (value chain, gender, pilot project, action research) 3) Agree on national programme outputs and targets, building on contributions by components, partners 4) Develop work plans and budget for the national component

Das, A.K. ; Vass, K.K. ; Shrivastava, N.P. ; Katiha, P.K. 2009.

Cage culture in reservoirs in India (a handbook). The WorldFish Center technical manual no.1948. The WorldFish Center, Penang, Malaysia. 24 p.

This document is part of a series of 5 technical manuals produced by the Challenge Program Project CP34 "Improved fisheries productivity and management in tropical reservoirs". The reservoirs of India have a combined surface area of 3.25 million hectares (ha), mostly in the tropical zone, which makes them the country¡¯s most important inland water resource, with huge untapped potential. The prime objective of cage culture discussed here is to rear fingerlings measuring >100 millimetres (mm) in length, especially carp, for stocking reservoirs. The manual discusses various aspects of cage culture from site selection to its economic benefits.

Evans, L. ; Andrew, N. 2009.

Diagnosis and the management constituency of small-scale fisheries. The WorldFish Center working paper 1941. The WorldFish Center, Penang, Malaysia. 26 p.

Diagnosis and adaptive management can help improve the ability of small-scale fisheries (SSF) in the developing world to better cope with and adapt to both external drivers and internal sources of uncertainty. This paper presents a framework for diagnosis and adaptive management and discusses ways of implementing the first two phases of learning: diagnosis and mobilising an appropriate management constituency. The discussion addresses key issues and suggests suitable approaches and tools as well as numerous sources of further information. Diagnosis of a SSF defines the system to be managed, outlines the scope of the management problem in terms of threats and opportunities, and aims to construct realistic and desired future projections for the fishery. These steps can clarify objectives and lead to development of indicators necessary for adaptive management. Before management, however, it is important to mobilize a management constituency to enact change. Ways of identifying stakeholders and understanding both enabling and obstructive interactions and management structures are outlined. These preliminary learning phases for adaptive SSF management are expected to work best if legitimised by collaborative discussion among fishery stakeholders drawing on multiple knowledge systems and participatory approaches to assessment.

Habib, O.A. ; Shehata, M. ; Zaki, M. ; Ammar, H. ; Abdel Rahman, S.H. 2009.

Building fish enclosure in Lake Nasser. The WorldFish Center/Lake Nasser Development Authority. Technical manual no.1950. The WorldFish Center, Penang, Malaysia. 16 p.

This document is part of a series of 5 technical manuals produced by the Challenge Program Project CP34 “Improved fisheries productivity and management in tropical reservoirs”. This manual is based on the experience gained by the partners of the project “Improved Fisheries Productivity and Management in Tropical Reservoirs” (CP34) funded by the Challenge Program on Water and Food. As part of this project, the partners designed, developed and tested in the field three enclosures in Lake Nasser in Egypt. The objective of the manual is to document for practitioners the main technical lessons gained from these experiments.

Heck, S. 2009.

Regional synthesis and policy implications: discussion paper prepared for the first policy advisory group meeting, 24-26 Mar 2009, Lilongwe, Malawi. The WorldFish Center Project Report 1978. Penang, Malaysia. 7 p.

The WorldFish Center and the UN Food and Agriculture Organization (FAO) are currently implementing a Regional Programme entitled Fisheries and HIV/AIDS in Africa: Investing in Sustainable Solutions, to strengthen the capacity in the region to develop sustainable solutions to enhance the contributions of fish and fisheries to economic and human development. In particular, the programme is building a strategic response to HIV/AIDS in the fisheries sector that will generate benefits for vulnerable groups in wider society. This short paper tries to synthesize the findings so far, to place them in a wider context of what we know about fisheries and HIV/AIDS in the region and globally, and to identify key issues of regional significance that require policy intervention at different levels.

Hüsken, S.M.C. 2009.

Profiles of project activities by technical partners under the regional programme "Fisheries and HIV/AIDS: Investing in sustainable solution". Compilation document prepared for the first policy advisory group meeting, 24-26 Mar 2009, Lilongwe, Malawi. The WorldFish Center Project Report 1977. Penang, Malaysia. 68 p.

The WorldFish Center and the UN Food and Agriculture Organization (FAO) are currently implementing a Regional Programme entitled Fisheries and HIV/AIDS in Africa: Investing in Sustainable Solutions, to strengthen the capacity in the region to develop sustainable solutions to enhance the contributions of fish and fisheries to economic and human development. In particular, the programme is building a strategic response to HIV/AIDS in the fisheries sector that will generate benefits for vulnerable groups in wider society. With financial support from the Swedish-Norwegian Regional Programme on HIV/AIDS in Africa, this programme is conducting research-for-development activities and implementing pilot interventions in selected fishing communities in eight countries in sub-Saharan Africa, namely Benin, Democratic Republic of Congo (DRC), Cameroon, Nigeria, Malawi, Mozambique, Uganda and Zambia. In all eight countries, three technical focus areas have been identified through national consultations 1) Options for reducing vulnerability along the fish marketing chain; 2) Enhancing nutrition benefits from small scale aquaculture and fisheries; 3) Institutional change to increase investment in viable support options

Hüsken, S.M.C. 2009.

Report of the first meeting of the roundtable consultative group on HIV/AIDS in Luapula fisheries, Zambia. The WorldFish Center Project Report 1973. Penang, Malaysia. 18 p.

The WorldFish Center organized a roundtable meeting in Mansa, Zambia to provide to provide an opportunity for a wide range of agencies to exchange their knowledge and experiences of working with fishing communities and fish traders in Luapula Province. A total of 28 people participated, from government, NGOs and civil society, 6 of whom traveled from Lusaka. Objectives of the roundtable meeting were 1) To get an overview of agencies and their activities relating to fishing communities in Luapula province; 2) To discuss issues related to health, HIV/AIDS and social development affecting fishing communities in Luapula province; 3) To identify challenges in supporting fishing communities; 4) To discuss areas of potential collaboration in 2009 and beyond.

Hüsken, S.M.C. ; Heck, S. 2009.

Report of the first policy advisory group meeting of the regional programme "Fisheries and HIV/AIDS: Investing in sustaining solution". The WorldFish Center Project Report 1980. Penang, Malaysia. 27 p.

The WorldFish Center and the UN Food and Agriculture Organization (FAO) are currently implementing a Regional Programme entitled Fisheries and HIV/AIDS in Africa: Investing in Sustainable Solutions, to strengthen the capacity in the region to develop sustainable solutions to enhance the contributions of fish and fisheries to economic and human development. In particular, the programme is building a strategic response to HIV/AIDS in the fisheries sector that will generate benefits for vulnerable groups in wider society. With financial support from the Swedish-Norwegian Regional Programme on HIV/AIDS in Africa, this programme is conducting research-for-development activities and implementing pilot interventions in selected fishing communities in eight countries in sub-Saharan Africa, namely Benin, Democratic Republic of Congo (DRC), Cameroon, Nigeria, Malawi, Mozambique, Uganda and Zambia. In all eight countries, three technical focus areas have been identified through national consultations 1) Options for reducing vulnerability along the fish marketing chain; 2) Enhancing nutrition benefits from small scale aquaculture and fisheries; 3) Institutional change to increase investment in viable support options; This report presents initial findings by the Regional Programme, a regional synthesis and policy implications of these programme findings, and policy recommendations to address HIV/AIDS in the fisheries sector in Africa, as defined by the PAG members during its first meeting in Lilongwe.

Kalunga Mawazo, B. ; Ngoy Mwana, A. ; Nkulu Kamuyele, K. ; Mutala, S. ; Hüsken, S.M.C. 2009.

Analyse des facteurs et la vulnérabilité au VIH/SIDA des pêcheurs et des femmes commerçantes de poissons dans les camps de pêche dans la région de Kasenga-Luapula-Moero, Province du Katanga. République Démocratique du Congo. The WorldFish Center Project Report 1971. Penang, Malaysia. 36 p.

Kher, A. 2009.

Review of social science literature on risk and vulnerability to HIV/AIDS in fishing communities in Sub-Saharan Africa. The WorldFish Center Project Report 1966. Penang, Malaysia. 38 p.

The WorldFish Center and FAO are implementing a regional programme entitled "Fisheries and HIV/AIDS in Africa; investing in sustainable solutions", funded by the Swedish International Development Cooperation Agency (Sida) and the Norwegian Ministry of Foreign Affairs. As part of this project, the Overseas Development Group/School of Development Studies was asked to produce a literature review on 'Fisheries and HIV/AIDS in Africa: evidence from social science, medical and policy research'. The task was to collate available data from socio-economic and medical research to identify trends in fishing communities in Sub-Saharan Africa. This paper is the second of three parts of the literature review, which covers review of social science research on risk and vulnerability to HIV/AIDS in the fisheries sector in Sub-Saharan Africa

Kher, A. 2009.

Étude de la documentation en science sociale sur le risque et la vulnérabilité liés au VIH/SIDA dans les communautés de pêcheurs en Afrique subsaharienne. The WorldFish Center Project Report 1967. Penang, Malaysia. 38 p.

Lungu, A. ; Hüsken, S.M.C. 2009.

Field study: assessing migration and mobility patterns, access to health services and vulnerabilities of female fish traders in the Kafue Flats fishery, Zambia: research design report. The WorldFish Center Project Report 1970. Penang, Malaysia. 14 p.

The WorldFish Center in Lusaka is implementing a regional collaborative programme entitled "Fisheries and HIV&AIDS in Africa; investing in sustainable solutions". The programme is funded by the Swedish International Development Cooperation

Agency (Sida) and the Norwegian Ministry of Foreign Affairs. Under the Zambia component, the technical focus area "Options for reducing vulnerability along the fish marketing chain" focuses on the Kafue Flats fishery in Zambia. This study aims to identify vulnerability factors affecting fisher folk and fish traders in the Kafue Flats, especially those that make them susceptible and vulnerable to HIV&AIDS. The study will provide the analytical basis for pilot interventions to reduce specific vulnerability factors and enhance livelihoods for fisher folk and fish traders in the Kafue Flats fishery. This report describes the methodologies and approaches used for the study in the Kafue Flats fishery, and how the findings and analyses will be used for the further implementation and learning of the programme.

Macuiane, M. ; Nagoli, J. ; Chilima, D. 2009.

Malawi / Mozambique implementation partners planning meeting, 15-16 Oct 2007. Workshop report. The WorldFish Center Project Report 1958. Penang, Malaysia. 15 p.

The WorldFish Center and FAO are implementing a regional programme entitled "Fisheries and HIV/AIDS in Africa; investing in sustainable solutions", funded by the Swedish International Development Cooperation Agency (Sida) and the Norwegian Ministry of Foreign Affairs. The WorldFish Center organized a stakeholder workshop for planning of the activities. under the project Fisheries and HIV/AIDS in Africa for Malawi and Mozambique focusing on the Nacala corridor. The meeting was expected to generate ideas on the strategy of the program toward its implementation in both countries and come up with the list of potential partners from both countries as well as defining their roles and responsibilities in the project. The objectives of the workshop are to: 1) Create a shared understanding of programme objectives and processes 2) Develop an understanding of the technical programme focus and approaches (value chain, gender, pilot project, action research) 3) Agree on national programme outputs and targets, building on contributions by components, partners 4) Develop work plans and budget for the national component

McPherson, A. 2009.

Health service delivery and other HIV/AIDS related interventions in the fisheries sector in Sub-Saharan Africa: a literature review. The WorldFish Center Project Report 1964. Penang, Malaysia. 30 p.

The WorldFish Center and FAO are implementing a regional programme entitled "Fisheries and HIV/AIDS in Africa; investing in sustainable solutions", funded by the Swedish International Development Cooperation Agency (Sida) and the Norwegian Ministry of Foreign Affairs. As part of this project, the Overseas Development

Group/School of Development Studies was asked to produce a literature review on 'Fisheries and HIV/AIDS in Africa: evidence from social science, medical and policy research'. The task was to collate available data from socio-economic and medical research to identify trends in fishing communities in Sub-Saharan Africa. This paper is the first of three parts of the literature review, which covers review of research on health service delivery and other HIV/AIDS related interventions in the fisheries sector in Sub-Saharan Africa.

McPherson, A. 2009.

Fourniture des services de santé et autres interventions de lutte contre le VIH/SIDA dans le secteur halieutique en Afrique sub-saharienne. The WorldFish Center Project Report 1965. Penang, Malaysia. 34 p.

Musumali, M.M. ; Heck, S. ; Husken, S.M.C. ; Wishart, M. 2009.

Fisheries in Zambia: an undervalued contributor to poverty reduction. Policy Brief 1913. The WorldFish Center/The World Bank. Penang, Malaysia. 15 p.

This brief examines the fisheries sector in Zambia. Fisheries sector has made a small contribution (1.24%) to the country's national GDP. However, It is estimated that more than 20 percent of animal protein intake for people in Zambia is from fish. Hence there is an important role for fish and fish products in the food and nutrition security of the Zambian population, especially the urban poor and people living with HIV and AIDS (PLHIV). The brief also includes recommendations of how fisheries can contribute to the government's goal of a more inclusive, diversified and sustained economic growth.

Nagoli, J. ; Phiri, E.M. ; Kambewa, E. ; Jamu, D. 2009.

Adapting integrated agriculture aquaculture for HIV and AIDS-affected households: the case of Malawi. The WorldFish Center working paper 1957. The WorldFish Center, Penang, Malaysia.

The WorldFish Center in conjunction with World Vision Malawi carried out a project to improve income and nutrition status of households affected by HIV and AIDS with funding from the World Bank. The project was implemented in Southern Malawi particularly in the West of Zomba District from July 2005 to June 2006. Through participatory approaches, the project identified constraints that limit HIV and AIDS affected households' realisation of the benefits from fish farming and adapted technologies and practices for the affected beneficiaries to boost fish production and utilization. Specifically, the project sought (1) to identify the constraints that

limit HIV and AIDS affected households to realise the benefits from fish farming and based on the constraints, (2) to adapt technologies and practices for use by the affected beneficiaries to boost fish production and utilization.

Ofori, J.K. ; Dankwa, H.R. ; Brummett, R. ; Abban, E.K. 2009.
Producing tilapia in small cage in West Africa. The WorldFish Center technical manual no.1952. The WorldFish Center, Penang, Malaysia. 16 p.

This document is part of a series of 5 technical manuals produced by the Challenge Program Project CP34 “Improved fisheries productivity and management in tropical reservoirs”. The Water Research Institute (WRI) in Akosombo, Ghana, is working to bring cage aquaculture technology to smallholder farmers. The stocking, feeding and cage-construction technology piloted by WRI is now being widely adopted in the Lower Volta basin in Ghana. The results of WRI research over the period 2005-2009 are presented here as a guide to potential investors.

Purcell, S.W. ; Gossuin, H. ; Agudo, N.S. 2009.
Status and management of the sea cucumber fishery of La Grande Terre, New Caledonia. Programme ZoNéCo. The WorldFish Center studies and review 1901. The WorldFish Center Center, Penang, Malaysia. 138 p.

From October 2006 to May 2008, The WorldFish Center coordinated a ZoNéCo project to provide support to the Southern and Northern Provinces for decisions about how best to manage the sea cucumber fishery around La Grande Terre. We collected data during underwater population surveys, questionnaire-based interviews with fishers and processors, and landing catch surveys. A core aim was to furnish the Provinces with ‘ballpark’ estimates of the abundance and density of commercially important sea cucumbers on 50 lagoon and barrier reefs. Analysis and synthesis of the ecological and sociological data provide the basis for informed recommendations for fisheries management. Counts of trochus and giant clams on the reefs allow us to also describe the general status of those resources. We propose 13 recommendations for management actions and fishery regulations and advocate an adaptive management approach. This multidisciplinary study should serve as a useful template for assessing other fisheries, and we provide a series of generic ‘lessons learnt’ to aid future programmes.

Russell, S. ; Grellier, R. ; Hüsken, S.M.C. 2009.

Regional technical workshop, Lusaka, Zambia. 17-19 Jun 2008. Workshop report. The WorldFish Center Project Report 1963. Penang, Malaysia. 14 p.

The WorldFish Center and FAO are implementing a regional programme entitled "Fisheries and HIV/AIDS in Africa; investing in sustainable solutions", funded by the Swedish International Development Cooperation Agency (Sida) and the Norwegian Ministry of Foreign Affairs. The main purpose of the workshop was to bring together partners on the programme to share ideas and current research proposals, to strengthen these research proposals by taking into account cross cutting issues such as ethics and gender, and to determine arrangements for ongoing collaborative support.

Tanzarn, N. 2009.

Lake Victoria component planning meeting 13-14 Nov 200. Workshop report. The WorldFish Center Project Report 1959. Penang, Malaysia. 16 p.

The WorldFish Center and FAO are implementing a regional programme entitled "Fisheries and HIV/AIDS in Africa; investing in sustainable solutions", funded by the Swedish International Development Cooperation Agency (Sida) and the Norwegian Ministry of Foreign Affairs. In Uganda, the Department of Fisheries Resources will provide the institutional support. Considering its role of overseeing the mainstreaming of HIV/AIDS, the Uganda AIDS Commission (UAC) will play a key role in the national coordination of the project. The responsibility of the Lake Victoria Fisheries Organisation (LVFO) will be to ensure that stakeholders from around the Lake actively participate in the discussions and that the recommendations arising from the project are of regional significance. The workshop objectives are to: 1) Create a shared understanding of programme objectives and processes 2) Develop an understanding of the technical programme focus and approaches (value chain, gender, pilot project, action research) 3) Agree on national programme outputs and targets, building on contributions by components, partners 4) Develop work plans and budget for the national component

Te Lintelo, D. 2009.

Food security, nutrition and HIV/AIDS in African fisheries: emerging evidence and research directions: a literature review. The WorldFish Center Project Report 1968. Penang, Malaysia. 39 p.

The WorldFish Center and FAO are implementing a regional programme entitled

"Fisheries and HIV/AIDS in Africa; investing in sustainable solutions", funded by the Swedish International Development Cooperation Agency (Sida) and the Norwegian Ministry of Foreign Affairs. As part of this project, the Overseas Development Group/School of Development Studies was asked to produce a literature review on 'Fisheries and HIV/AIDS in Africa: evidence from social science, medical and policy research'. The task was to collate available data from socio-economic and medical research to identify trends in fishing communities in Sub-Saharan Africa. This paper is the third of three parts of the literature review, which covers review of research on the relationship between food and nutrition security and HIV/AIDS, and how this applies to the fisheries sector in Sub-Saharan Africa.

Te Lintelo, D. 2009.

Sécurité alimentaire, nutrition et VIH/SIDA dans les pêcheries africaines: information émergente et direction de la recherche: Étude documentaire. The WorldFish Center Project Report 1969. Penang, Malaysia. 46 p.

Vass, K.K. ; Shrivastava, N.P. ; Katiha, P.K. ; Das, A.K. 2009.

Enhancing fishery productivity in small reservoir in India: technical manual. WorldFish Center technical manual no.1949. The WorldFish Center, Penang, Malaysia. 19 p.

This document is part of a series of 5 technical manuals produced by the Challenge Program Project CP34 "Improved fisheries productivity and management in tropical reservoirs". Inland capture fisheries in India have declined in recent years, leaving thousands of fishers to sink deeper into poverty. Freshwater aquaculture in small water bodies like ponds now contributes 80% of the country¡¯s inland fish production. This manual outlines the use of small reservoir for freshwater aquacultureas a means of providing rural areas with food and livelihoods and protecting aquatic ecosystems, in particular by facilitating the conservation of indigenous fish species.

The WorldFish Center. 2009.

Mangrove revival diversifies livelihoods while addressing climate change. Brief 1945. WorldFish Center, Penang, Malaysia. 4 p.

Funded by the Australian Government, The project "Poverty alleviation, mangrove conservation and climate change: Carbon offsets as payments for mangrove ecosystem services in Solomon Islands" explores whether or not mangroves can be included in offset projects. This brief outlines the key elements of the projects,

its key deliverables. The project offers the Government of Solomon Islands timely advice and enhanced technical expertise to cope with the costs and challenges arising from climate change. It trains Solomon Island scientists on the implications of, and opportunities for, using tradable carbon credits as a conservation tool and livelihood opportunity.

The WorldFish Center. 2009.
Fisheries and aquaculture can provide solutions to cope with climate change. Issue brief 1701. The WorldFish Center, Penang, Malaysia. 4 p.

This brief explains how climate change will affect aquatic systems and how fisheries and aquaculture will need to adapt to meet these changes. It provides a number of examples of how our projects are providing solutions to cope with climate change.

The WorldFish Center. 2009.
Aquaculture options for alternative livelihoods: the experience of the Adivasi Fisheries Project in Bangladesh. Factsheet 1946. The WorldFish Center, Penang, Malaysia. 8 p.

The Adivasi Fisheries Project (AFP) set out in 2007 to help Adivasis in the north and northwest of Bangladesh find new and more sustainable livelihoods. It is based on 2 decades of WorldFish Center research in Bangladesh on aquaculture techniques for smallholders and community fisheries management and targeted disadvantaged rural miniorities called Adivasi. The project significantly improved Adivasi households' livelihoods. Monitoring survey results found all of the fishery-related livelihood options profitable. As farmers were able to improve their livelihoods after a single year of AFP intervention, it is expected that they will not only sustain this improvement but build on it as their experience grows and with continued technical support from the AFP in 2009.

The WorldFish Center. 2009.
A better margin: disadvantaged minorities in rural Bangladesh boost their incomes with new fish skills. Factsheet 1954. The WorldFish Center, Penang, Malaysia. 8 p.

This factsheet hightlights the achievements of the Adivasi Fisheries Project (AFP) targeting the disadvanged rural minorities called Adivasi. In leading the AFP, the WorldFish Center built on 2 decades of earlier work in Bangladesh on aquaculture techniques for smallholders and communities fisheries management. The AFP lifted the average income of participating Adivasi households. The increased income

improved their food securities, reducing their food deficit period from 1.7 months in 2007 to 1.4 months in 2008.

The WorldFish Center. 2009.

Climate change: research to meet the challenges facing fisheries and aquaculture. Issue brief 1915. The WorldFish Center, Penang, Malaysia 6 p.

Climate change poses new challenges to the sustainability of fisheries and aquaculture systems, with serious implications for the 520 million people who depend on them for their livelihoods and the nearly 3 billion people for whom fish is an important source of animal protein. This issues brief highlights key areas that WorldFish Center aims to work with partner to tackle this global problem.

The WorldFish Center. 2009.

Climate change and fisheries: vulnerability and adaptation in Cambodia. Issue brief 2008. The WorldFish Center, Penang, Malaysia 8 p.

Cambodia is highly vulnerable to the effects of climate change on fisheries, which supply livelihoods for millions and up to 80% of all animal protein in the diet. Most fisheries are highly variable by nature and subject to environmental change, including climate change. Hydropower dam construction, intensified fishing pressure and macroeconomic drivers are likely to affect Cambodian fisheries more immediately and visibly than climate change. Building fisher communities' capacity to adapt to these more immediate changes goes hand-in-hand with improving their capacity to adapt to climate change. A far-reaching strategy to improve adaptive capacity and strengthen resilience promises to reduce poverty and enhance food production now and in the years to come.

The WorldFish Center. 2009.

Changements climatiques : quelle recherche pour relever les défis posés à la pêche et à l'aquaculture. Issues Brief 2000. The WorldFish Center, Penang, Malaysia. 8 p.

Le changement climatique pose de nouveaux défis pour la durabilité des pêches et de l'aquaculture, avec de sérieuses conséquences pour les 520 millions de personnes qui en dépendent pour leur subsistance et les presque 3 milliards de personnes pour qui le poisson est une importante source de protéines animales. La présente étude identifie les domaines clés sur lesquels WorldFish Center vise à travailler avec ses partenaires pour s'attaquer à ce problème mondial.

The WorldFish Center. 2009.

AsiaFish: the best can become better. Lesson learned 1903. The WorldFish Center, Penang, Malaysia. 6 p.

AsiaFish is the most comprehensive analytical model available for Asia's seafood markets, and additional funding and collaboration can extend it to enable more complex analyses and projections or to serve other regions.

The WorldFish Center. 2009.

Dissemination and adoption of milkfish aquaculture technology in the Philippines. Lesson learned 1904. The WorldFish Center, Penang, Malaysia. 6 p.

This publication is adapted from the report of the project "Dissemination and adoption of milkfish aquaculture technology in the Philippines. 2007" The key lessons learned are highlighted: 1)Strengthen extension systems to better disseminate improved milkfish hatchery and nursery technologies. 2) Enhance the efficiency of milkfish grow-out culture by introducing restrictive feed management and polyculture with shrimp. 3) Train producer communities to add value by processing their milkfish harvest. 4) Improve milkfish farmers¡¯ access to credit.

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