

Most of the farmers in Mr Insa's nursing group are small-scale operators who used to be rice or vegetable farmers but now have a most profitable extra livelihood; some were laid off from other jobs or were government officers. Nursing now provides them with 70-100% of their total income. Mr Insa who has 10 years experience is a university graduate who used to work for a feed company. He pointed out that operating a hatchery requires considerably more skill than nursing or grow-out.

Cibaraja Fish Seed Market

I also visited the famous Cibaraja fish seed market in Sukabumi which has been operating for over 50 years. The sale of fingerlings is much reduced today as purchases of the large number of fingerlings required to stock cages in reservoirs is done directly from nursing farms. Table fish harvested from cages are also held live in the running water system at the market prior to being sold but the largest business is now ornamental fish, especially gold fish and koi carp. I also visited a local government project near Sukabumi in which about 100 poor farmers were raising ornamental fish in suspended net cages in a small reservoir. The project was ideal for poor farmers as it did not require land, each cage was small and little capital investment was required. Harvested fish were quarantined in aquaria in a building by the side of the reservoir prior to marketing.

Towards the future

The biggest concern expressed repeatedly during my visits is the future of cage culture in reservoirs, especially in Cirata Reservoir, which currently supply about 80% of the domestic fish supply of the densely populated island of Java. A major concern is the declining water quality due to massive inputs of nutrients from pelleted feed. In Cirata the early morning dissolved oxygen is often as low as 0.8 ppm at 1m depth. During the last turnover of the reservoir's water two years ago, there was an 80% mortality of all species.



A local government project in which poor farmers are raising ornamental fish in suspended cages in a small reservoir.

Of the three large reservoirs in West Java, I was informed that common carp can no longer be grown in Saguling Reservoir as the water quality is now so poor, only more tolerant species such as giant gourami, Nile tilapia and striped catfish. Production and intensity of cage culture have been reduced in Cirata and if water quality continues to decline only species more tolerant of poor water quality will be able to be farmed. A new reservoir is under construction to the east of Bandung, Rajamandala. It is to be hoped that the introduction of cage culture in the new reservoir will be regulated so that poor rice farmers will be able to farm fish in cages and fish production will be within the reservoir's carrying capacity. The trials of high density pond culture of common carp and striped catfish have been stimulated by the need to develop an alternative grow-out system to cage culture.

There is concern about sustainability of the water supply in West Java as it is declining year by year due to population growth and the development of settlements in rural areas, especially in the watersheds in the mountains. I was informed that Sumatra is about 10 years behind Java in the development of aquaculture and has great potential for seed and grow-out production. Many areas in Sumatra are similar to the main aquaculture areas of West Java so it is likely to become a major frontier for aquaculture development and may eventually supply fish to Java.

Better Management Practices (BMPs) - gateway to ensuring sustainability of small scale aquaculture and meeting modern day market challenges and opportunities

Mohan, C.V. and De Silva, S.S., NACA

Development and adoption of Better Management Practices (BMPs) for key aquaculture commodities is gradually increasing in the region. However, there appears to be a lot of confusion in the minds of farmers, policy makers and other stakeholders about the concept and approaches. Often, it is confused with standards and certification. The purpose of this article is to highlight the concept of better management practices, how they can be developed and adopted for specific commodities and or farming systems, and their benefits to small scale farmers and rural communities. NACA

has been involved in the development and adoption of better management practices since 2000 in a number of countries in the Asia-Pacific region, working in conjunction with country partners and donors, and international organisations. The lessons learned and experience gained strongly suggest that better management practices are the gateway to ensuring sustainability of small scale aquaculture and meeting modern day market challenges and opportunities. The purpose of

this article is to apprise all stakeholders how NACA has gone about its task of developing and adopting BMPs and to enumerate a few successes in this regard.

Asian aquaculture is dominated by small scale farmers, conveniently defined as those who own or lease, operate and manage farms. These farmers face numerous challenges in a globalised market place, amongst which are: access to technical knowledge, lack of enabling government policies and programs, access to credit and insurance, compliance to food safety standards (e.g. antibiotics), minimising disease related losses, meeting stringent market requirements, including certification, meeting environmental and ethical standards and wildlife and biodiversity requirements. At the same time, the demand for quality and responsibly produced and certified aquaculture products is predicted to increase substantially in coming years. It is very important that small scale farmers are better prepared to meet these challenges in order to sustain their livelihoods, and indeed continue to provide sea food to the consumers. The way to meet the above challenges and the most rational, practical and technically and economically feasible option is to implement better management practices through a cluster management approach, in a given locality.

What are better management practices?

Better Management Practices (BMPs) in the aquaculture context outline norms for responsible farming of aquatic animals, the implementation of which is voluntary. BMPs

are not a certification standard. BMP implementation improves the quantity, safety and quality of products taking into consideration animal health and welfare, food safety, environmental and socio-economical sustainability. Implementation of BMPs can help to achieve compliance with quantifiable standards and indicators set by international agencies and third party certification bodies.

Standards are set from a consumer view point, taking into consideration social equity and well being, environmental, food safety and quality, national regulations and other criteria. BMPs, on the other hand, are commodity specific and location specific management practices that have been developed to meet the norms of responsible farming and at the same time reduce risks to culture operations and maximise returns, the adoption of which by and large satisfies by implication many of the issues of concern to consumers. In doing so, BMPs have most of the ingredients that are required to meet independent standards. Most standards use the principles of responsible farming which takes into account both mandatory and voluntary standards. BMPs are not a onetime solution, they are subjected to gradual evolution, improvement and revision. BMPs can be tailor made and contextualised to meet some of the quantifiable standards, where and if necessary. In simple terms, standards tell us what is expected while BMPs tell us how farmers can reduce risks to their culture operations, maximise returns, reduce losses and at the same time achieve compliance to quantifiable standards.

How are BMPs developed and validated?

As emphasised earlier, BMPs are commodity specific and location specific and have to follow the generic principles of responsible aquaculture. It is generally agreed that for all cultured commodities it is necessary to underpin the general principles for responsible farming that would cover environmental, social, ethical, food safety and husbandry issues. The first step in developing BMPs is gaining an in depth understanding of the culture system(s) and cultured species. This should be done at the population level and not in one or two ponds. Population based approaches to understand the problems and issues confronting a cultured commodity in a specific farming area are gaining importance. Identifying risk factors (e.g. environment, disease, food safety, market access) to the long term sustainability of the farming system, at the population level using epidemiological principles (e.g. risk analysis) is fundamental to developing BMPs. Once risk factors are identified, new management interventions are either developed or existing management methods revised/modified to address the identified risk factors. This must be done in consultation with the practitioners and other stakeholders.

Once a set of science based interventions are developed, through farm surveys, stakeholder consultations and scrutiny of existing scientific knowledge, it is necessary to test the interventions and validate them. This is normally carried out through farm demonstration studies set up for scrutiny by the community. Interventions validated through pilot testing, demonstrations and farmer consultations are referred to as better management practices. These have to be rational, practical and technically and economically feasible for small



scale farmers to implement. BMPs are constantly evolving and changing and it is necessary to consider approaches to continuously evaluate and improve BMPs.

Examples of science based information used in the development of the BMPs for shrimp (India) and catfish (Mekong Delta, Vietnam) are entailed in the following scientific publications:

- Umesh, N.R., Chandra Mohan, A.B., Ravi Babu, G., Padiyar, P.A., Phillips, M.J., Mohan, C.V. and Bhat, B.V. 2009. Shrimp farmer in India: Empowering small scale farmer through a cluster-based approach. In: Success Stories in Asian Aquaculture (S.S. De Silva, F.B. Davy, eds.), pp.43-68. Springer-IDRC-NACA, Dordrecht
- Umesh, N.R., Mohan, C.V., Phillips, M.J., Bhat, B.V., Ravi Babu, G., Chandra Mohan, A.B. and Padiyar, P.A. 2008. Risk analysis in aquaculture – experiences from small-scale shrimp farmers of India. In M.G., Bondad-Reantaso, J.R. Arthur and R.P. Subasinghe (eds). Understanding and applying risk analysis in aquaculture. FAO Fisheries Technical Paper. No. 519. Rome, FAO. pp.237-244.
- Mohan, C.V., Phillips, M.J., Bhat, B.V., Umesh, N.R. and Padiyar, P.A. 2008. Tools for preparedness and response: Farm level plans/ husbandry measures. In: Changing trends in managing aquatic animal disease emergencies. Rev. Sci. Tech. Off. Int. Epiz., 2008, 27 (1): 161-173
- Phan Lam T., Bui Tam M., Nguyen, T.T.T., Gooley, G.J., Ingram, B.A., Nguyen Hao V., Nguyen Phuong T. De Silva, S.S., 2009. Current status of farming practices of striped catfish, *Pangasianodon hypophthalmus* in the Mekong Delta, Vietnam. Aquaculture, 296: 227-236.
- Bui Tam, M., Phan Lam, T., Ingram, B.A., Nguyen, T.T.T., Gooley, G.J., Nguyen Hao, V., Nguyen, Phuong, T., De Silva, S.S. Breeding and seedstock production practices of striped catfish, *Pangasianodon hypophthalmus* in the Mekong Delta, Vietnam. Aquaculture (in press)
- De Silva, S.S., Ingram, B.A., Nguyen, P.T., Bui Tam, T., Gooley, G.J., Turchini, G.M. Estimation of Nitrogen and Phosphorus in Effluent from the Striped Catfish Farming Sector in the Mekong Delta, Vietnam. Ambio (in press).

The type of dissemination material on BMPs will be commodity, community and need based, but always simple and easily comprehensible. An example used for catfish (Mekong Delta) popularisation of BMPs.

Promotion of adoption of BMPs among small scale farmers

Promoting the adoption of BMPs by small scale farmers is not simple. A dedicated team of field workers need to work with farmers day in and day out to bring about attitudinal changes in the farmers and wean them off preconceived ideas and concepts and conventional practices that are not conducive to the environment, sustainability and food safety. This is a slow process and takes lot of time and resource investment. Using appropriate extension methodologies to bring about change in the attitude of farmers and encouraging them to change their

CÁCH THỨC THỰC HIỆN BMP

Nâng cao hiệu quả kinh tế xã hội và bảo vệ môi trường thông qua áp dụng BMP

Để đạt hiệu quả cao trong việc thực hiện BMP, các hộ nuôi liên kết nên tập hợp thành nhóm, có thể dưới hình thức hiệp hội, câu lạc bộ hay hợp tác xã, để cùng thực hiện BMP do nhóm mình đưa ra và cùng quyết định các vấn đề kỹ thuật cũng như mua bán.

Các hộ nuôi liên kết tập hợp thành một nhóm, có thể dưới hình thức hiệp hội, câu lạc bộ hoặc hợp tác xã (do nhóm tự quyết định).

Hợp nhóm và tự xây dựng BMP cho nhóm mình. Mọi quyết định đều được thành viên trong nhóm bàn bạc và quyết định. Ví dụ như: thống nhất mật độ thả, kích cỡ giống thả, nơi mua cá giống, khi cá bị bệnh thì nên làm gì v.v...

Lên kế hoạch và thiết kế sổ tay ghi chép cho từng hộ trong nhóm. Chi tiết sổ tay ghi chép bao gồm các yếu tố chất lượng nước, xử lý nước và dịch bệnh, và chi tiết thu chi.

Lên lịch sinh hoạt của nhóm, bao gồm thời gian mua bán cá, thả giống, thu hoạch. Phối hợp thả giống và thu hoạch giữa các thành viên sao cho tránh tình trạng cung vượt cầu, ảnh hưởng đến giá bán và lợi nhuận cho người nuôi.

Mô hình này được thực hiện rất thành công trong nghề nuôi tôm ở Ấn Độ. Người nuôi với sự giúp đỡ và hỗ trợ của các nhóm liên quan, đã có thể tự mình tìm được thị trường, sản phẩm của họ được chứng nhận và họ đã có thể tự thương lượng giá bán.

Người nuôi cá tra ở Việt Nam đã có dịp tham quan mô hình BMP ở Ấn Độ và đang bước đầu phân đầu áp dụng mô hình này.

• TƯ CỐNG NHIỆM CỨ SỞ (CPL), BANG VIC-TORNA, AUSTRALIA • MANG LƯU CÁC TRƯNG TÀI NITRƠ CHUẨN A - THAI BINH DƯƠNG (NACA) •

• VIỆN NGHIÊN CỨU NUÔI THỦY SẢN 2 (VNI) • TRƯỜNG ĐẠI HỌC CẦN THƠ (CTU) •

ĐU AN "XÂY DỰNG CÁC BIỆN PHÁP NUÔI TỐT (BMP) CHO CÁ TRA Ở BẮNG BẮNG ĐỒNG CỬU LONG"
Do Chương trình CARD, Cơ quan phát triển quốc tế Úc-Á-Á-Á (AusAID) tài trợ

culture practices by incorporating BMPs is vital for successful adoption. In NACA's experience, a critical aspect of the introduction of BMPs has been the role of farmer groups/ clusters (cluster management). Provision of science based information to farmer groups through effective networking and communication is one important key to the success. The best example of this model is the modus operandi of NaCSA (see references in Box 1).

What is cluster/group management?

Aquaculture practices occur in areas that are conducive to the practice and availability of basic resources primarily water. Unlike land based agriculture in the case of aquaculture there is a much higher degree of interaction, e.g. use of a common water resource; common discharge channel etc. among adjacent practices/ farms. Therefore, in a group of farms sharing these common resources if one farmer does not practice BMPs there is a possibility of the others who are practicing BMPs being negated; in other words "all or none principle" is applicable to aquaculture practices in a locality in respect of BMP adoption. This calls for a cluster and or a group approach; all farms acting collectively and in unison and not individually.

Cluster management in simple terms can be defined as collective planning, decision making and implementation of crop activities by a group of farmers in a cluster (defined geographical area for example sharing common water source) through a participatory approach in order to address the common risk factors and accomplish a common goal

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11

(e.g. maximise returns, reduce disease risks, increase market access, procure quality seed,). Promotion of BMP adoption through a cluster management approach reaches more farmers. Cluster management brings several advantages to individual farmer members which otherwise is not possible. Because of the economy of scale which a cluster can achieve, forward and backward integration of culture operation with processors and hatcheries, respectively, is possible. A cluster approach increases the bargaining power and helps farmers to source quality inputs. Certification, which is cost prohibitive for individual farmers, can be accomplished through cluster certification. A cluster approach makes it easy to access credit and insurance compared to an individual farmer. The principle of sharing costs in a cluster approach ensures that common facilities such as feeder canal, roads and other infrastructure can be developed and maintained properly. Peer pressure prevents fellow farmers from resorting to irresponsible culture practices such as the use of banned antibiotics, release of water from disease affected ponds. Above all, cluster farming brings social harmony in a community, fundamental to the progress of society.

The key to cluster management is continuous and regular communication within and among groups. This can be achieved through regular meetings and or through the use of modern communication tools, which contrary to popular belief, rural farmers acquire the skills to use easily.

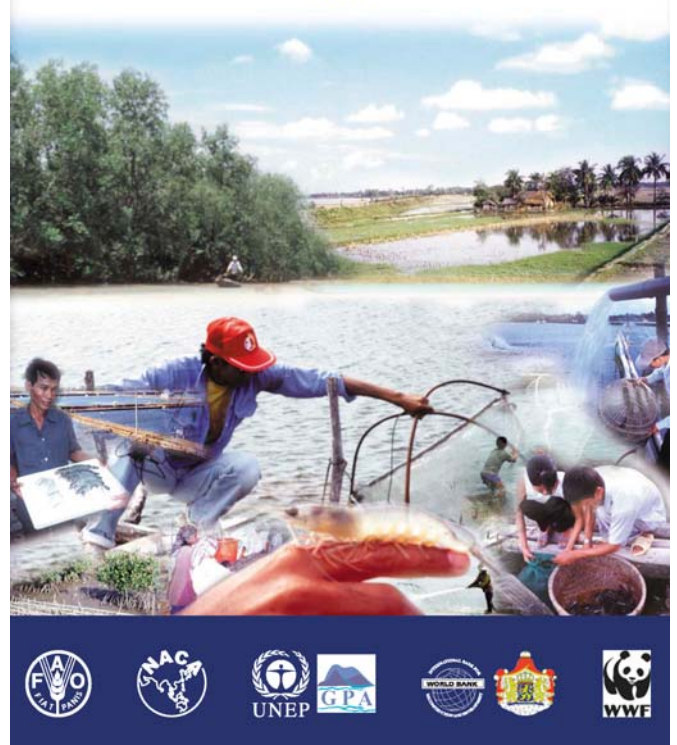
BMP work in Asia-Pacific

NACA's experience with BMP promotion work in India, Indonesia, Thailand and Vietnam in relation to commodities and that in Sri Lanka, Vietnam and Lao PDR in relation to culture based fisheries - a multi-species farming system - clearly suggests that BMPs improve yields, safety and improve quality of products taking into consideration animal health and welfare, food safety, environmental and socio-economical sustainability. Key BMP and cluster management work carried out in the region include:

- A shrimp farming project in India in collaboration with the Indian Marine Products Export Development Agency and the National Centre for Sustainable Aquaculture, ongoing since 2000.
- Shrimp farming work in Aceh, Indonesia under the ADB-ETESP project (2005-2009) in collaboration with FAO and IFC.
- Catfish farming work in Vietnam under the CARD program supported by AusAid (2008-2010) in collaboration with DPI, Victoria and RIA2 and CTU, Vietnam.
- WWF supported work on shrimp farming in Thailand and India in collaboration with DOF, Thailand and MPEDA, India, respectively.
- ACIAR supported work of strengthening networking and information sharing amongst BMP project implementers in the region.
- In addition NACA has also developed BMPs for the farming practices on culture-based fisheries in Sri Lanka, Vietnam and Lao PDR, under the auspices of ACIAR.

International Principles for Responsible Shrimp Farming

2006



The activities undertaken by these projects is summarised below.

Indian shrimp farming work

Since the early 1990s, the Indian shrimp aquaculture sector has been hard hit by viral diseases. To address rising concerns about the effect of diseases on the sustainability of the sector, the Government of India's Marine Products Export Development Authority (MPEDA) with the technical assistance of NACA and the support of the Indian Council of Agricultural Research (ICAR) and the Australian Centre for International Agricultural Research (ACIAR) initiated a programme in 2000 on "Shrimp disease control and coastal management". The programme started in 2001 with a large epidemiological study aimed at identifying the risk factors for key shrimp diseases. It also undertook to develop and disseminate BMPs to minimise farm-level risk factors for disease outbreaks and to address shrimp farming sustainability more broadly. The programme, which is now in its tenth year, was implemented in a phased manner. Some of the key stages of the programme included:

- A baseline study of the major diseases affecting the shrimp aquaculture operations (2000).
- A longitudinal epidemiological study in 365 ponds in Andhra Pradesh, east coast of India, to identify major risk factors associated with white spot disease and low productivity in *Penaeus monodon* culture ponds (2000-2001).

- Development of farm level contextualised BMPs to address the identified risk factors (2002).
 - Pilot testing of BMPs in selected farms (2002).
 - Production of a simple and practical shrimp health management manual based on the outcomes of the risk factor study and piloting of BMPs, to support farm and village level extension programmes (2002).
 - Development and testing of the concept of cluster farming for effective BMP adoption amongst farmers in a cluster, and expansion of BMP promotion to a large number of clusters (2003-2004).
 - Extension of some of the BMPs to downstream activities like hatcheries.
 - Review and refinement of BMPs, and production of BMP extension leaflets for each stage of the culture operation (2005).
 - Expansion of the BMP programme to clusters in five different states in India (2005-2006).
 - Conceptualisation of an institutional framework for maintaining the BMP and shrimp health extension programme (2006).
 - Establishment and inauguration of the National Centre for Sustainable Aquaculture (NaCSA) to carry forward the MPEDA/NACA programme activities (2007).
 - 2008-2010 and ongoing: consolidation of the program in the state of Andhra Pradesh and expansion to neighbouring states. Supporting clusters to access markets through certification programs on a pilot scale. Development of cluster certification guidelines.
- A questionnaire-based risk factor study involving hatchery, nurseries and grow out farmers.
 - Identification of risk factors and possible interventions.
 - Convening stakeholder workshops to discuss and refine prospective BMPs, and to provide training of farmers in record keeping.
 - Pilot testing of BMPs in selected clusters through the establishment of demonstration ponds and regular monitoring thereof.
 - Promotion of farmer groups and cluster management concept.
 - Vietnamese catfish farmers visited Indian shrimp farmers and clusters to observe their operation and BMP implementation.
 - WWF shrimp farming work in Thailand and India

The project supported farmer group formation and BMP adoption. The project undertook activities to:

- Create awareness about the criteria, indicators and standards of certification, including WWF standards.
- Provide small scale farmer feedback to the WWF shrimp aquaculture dialogue.
- Pilot test WWF shrimp standards in selected farmer groups in India and Thailand.

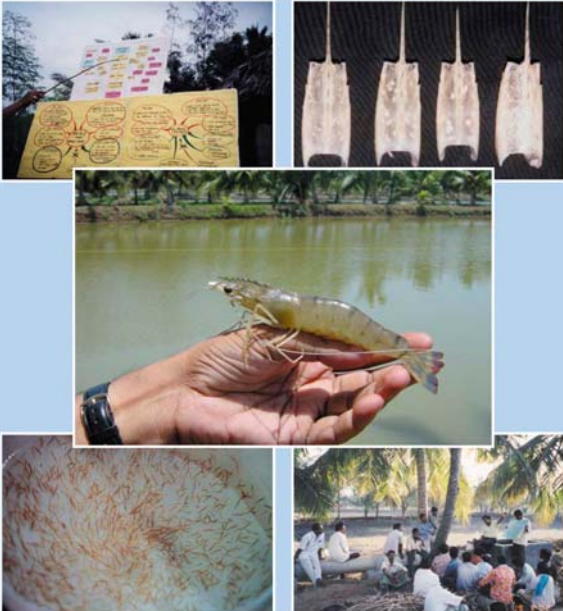
As of March 2010, NaCSA has formed 531 societies (clusters) covering 12091 farmers and 12889 ha. At present 54 staff members are working in NaCSA and majority of them are field based and working directly with farmers.



Shrimp farming work in Aceh, Indonesia

Using the Indian lessons BMPs were developed promoted to support rehabilitation of shrimp farming in tsunami affected Aceh, working in close collaboration with FAO, OISCA, WFC, ACIAR and other partners. The project:

- Established farmer groups, one Aceh aquaculture communication centre (AACC) and four Aceh Livelihoods service centres (ALSCs).
- Farmer groups were established from clusters of farms around ALSCs.
- The concept of BMPs and the cluster management approach was widely promoted.
- Catfish farming work in the Mekong Delta, Vietnam
- BMPs were developed through a process involving:

**Shrimp Health Management
Extension Manual**




 The Marine Products Export Development Authority
and
Network of Aquaculture Centres in Asia-Pacific
 

VERSION 2



2009

Better Management Practices (BMPs) for Striped Catfish (tra catfish) Farming Practices in the Mekong Delta, Vietnam



This document is prepared under the AusAID Funded Project, "Development of Better Management Practices for Catfish Aquaculture in the Mekong Delta, Vietnam (001/07VIE)", by Project Partners

- Fisheries Victoria, Department of Primary Industries, Victoria, Australia
- Network of Aquaculture Centres in Asia-Pacific
- Research Institute for Aquaculture No2, Vietnam
- Can Tho University, Vietnam

- Evaluating the financial and technical aspects of compliance to WWF standards by small scale farmers.

Networking of key BMP project implementers in the region

ACIAR supported a project to network and share experience amongst key personnel involved in implementing BMP projects in five countries, India, Indonesia, Thailand, Vietnam and Australia.

Conclusions

BMP projects, in India, Indonesia, Thailand and Vietnam provide good examples of translating the principles of responsible aquaculture into specific BMPs adapted to local farming conditions and ensuring their implementation by relevant stakeholders, with consequent gains in production, quality improvements and market accessibility. They also show evidence of the advantages of small-scale

farmers being organised (farmer groups/societies), sharing resources, empowering the stakeholders, helping each other and adopting BMPs. The implementation of the better management practices has provided benefits to the farmers, environment and society.

BMPs need to be grounded in valid scientific justification, rather than perceptions and or superficial experiences. Thus there is a need for R&D to validate key BMPs, and to quantitatively assess their impact on farm production and economics. Equally, there is a need to develop implementation mechanisms to permit large-scale scaling up of BMPs to create impacts among large numbers of small-scale farmers. Implementation mechanisms should also, far as possible, be supported by and built on systems already in place in the relevant country i.e. the cultural contexts prevalent in each country have to be taken into consideration.

Market links are now being explored between BMP implementers and buyers, but considerable further R&D work is necessary on strategies that connect small-farmers to markets. Enhanced regional cooperation is required to build on existing experiences and promote wider adoption of better management practices across selected commodities and countries in the Asian region.

Way forward

The lessons learned from BMP programs in the region should pave the way for development and implementation of BMPs for other key aquaculture commodities. BMPs should be simple, science based and cost effective and pragmatic, so that farmers can readily adopt them. Development, validation and implementation of commodity-specific BMPs should be seen as a way forward for promoting sustainable aquaculture in the region.

The regional BMP work of NACA and its partners has received a further boost with the support from the recently approved EU-ASEM project under the 7th framework. In the EU-ASEM project an attempt will be made to assess the true holistic impact of BMP programs and develop practical and feasible strategies for national and regional scaling up of BMP and cluster management programs.

NACA is open to collaboration and partnership with national, regional and international stakeholders interested in furthering the BMP and cluster management work. Please visit www.enaca.org for details about various projects and get in touch with the R&D Manager, Dr CV Mohan at mohan@enaca.org.

An update on organic scampi aquaculture in Andhra Pradesh

The National Centre for sustainable Aquaculture (NaCSA) and India Organic Aquaculture Project (IOAP), MPEDA took up organic fresh water prawn (*M. Rosenbergii*) farming in two societies of West Godavari District of Andhra Pradesh. A total of 27 farmers, from Sri Venkateswara Aqua Farmers Welfare Society, Matsyapuri and Sri Sainadha Aqua Farmers welfare

Society, Velivela were involved in the project covering 31 ha area. As the organic concept is new to the farmers a series of awareness meetings with the society members and officials of MPEDA/NaCSA were organised. In two of such meetings