



Semporna Islands Darwin Project
Capacity building to enhance Marine Protected Area effectiveness

*Progress towards development of alternative
livelihoods in the Tun Sakaran Marine Park*



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Progress towards development of alternative livelihoods in the Tun Sakaran Marine Park

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OBJECTIVES

This report has the following objectives:

- To provide a summary of the rationale behind the alternative livelihoods programme.
- To provide details of the activities and outcomes of the SIDP objective to 'enhance the scope and effectiveness of the alternative livelihoods programme' and
- To discuss ways forward with these or other initiatives.

SUMMARY

Fishing and gleaning in the area now within the 350km² Tun Sakaran Marine Park has caused stocks of reef fish and other edible species to fall to low levels. Efforts are now being made to reduce exploitation of marine resources in order to protect biodiversity and allow stocks to recover.

Implementing measures to reduce fishing effort will inevitably have an impact on communities that currently rely on fishing to make a living. For this reason it is important to investigate alternative or supplementary livelihoods in order to avoid hardship for these communities.

The Community Census (2006) revealed that fishing was the main occupation of approximately 30% of households in the Park. Virtually all of these households were from the Bajau Laut ethnic group which in 2006 amounted to 114 households. There has been some movement within and in and out of the Park since that time, but no significant long-term changes in the number of Bajau Laut households.

Although the full-time fishers are nearly all from the Bajau Laut community, the fishery itself is driven mainly by around 6-10 dealers who buy from the fishermen and then sell the catch in Semporna or further afield. Investigations carried out in 2010 revealed that a few of the dealers are based on the mainland, but most live in the Park. The Bajau Laut and to some extent the other ethnic groups within the Park also fish to provide food for direct household consumption rather than sale.

The focus for the alternative livelihood programme in the Park therefore needs either to be directly with the Bajau Laut and/or fish dealers or with other communities who might open up job opportunities for the fishing community.

A workshop held by SIDP and Sabah Parks on Pulau Selakan revealed a positive attitude towards alternative or supplementary livelihoods. This community is the most settled and educated within the Park and the majority of households are from the Bajau ethnic group and have Malaysian citizenship.

During discussions and focus group meetings with Bajau Laut communities in the Park some of the families expressed an interest in doing other activities besides fishing. They also felt that they should get some remuneration from visitors and TV companies who came to the Park and filmed their culture and way of life.

Tourism has the potential to open up a number of livelihood opportunities, ranging from 'Homestays' to nature or wildlife guiding and selling of craftwork. Other job opportunities lie in existing and planned low-impact mariculture operations, such as farming of seaweed and marine invertebrates.

An outcome of the Selakan workshop was that a number of residents expressed an interest in offering 'Homestay' to visitors. All Homestays in Sabah must be registered with the Sabah Homestay Association (SHA) and only those with Malaysian citizenship can apply.

Selakan is currently the most suitable location for Homestay in the Park as the majority of the people living in other locations do not hold Malaysian citizenship. Anyone wishing to run Homestay must also participate in a week-long training course prior to being accepted by the SHA.

Following the workshop, SIDP obtained the relevant registration forms and helped the local community complete and submit them to the SHA. We also invited Puan Ainah Sidek from the Ministry of Tourism, Culture and Environment to give a briefing to the Selakan Community and to assess the potential for Homestay on the island.

According to Puan Sidek, Selakan Island has beautiful scenery and other positive attributes but the state of the environment, hygiene and safety are major problems that prevent the island being introduced as a Homestay destination in the near future.

For the programme to move forward, ways will need to be found to address these issues and provide the required standards. This will need significant financial investment. Also key to the success of Homestay (as exhibited in other Homestays in the country) is the existence of a 'leader' or a 'local champion' within the community who can maintain momentum for the development of the programme within the village.

Craftwork also has potential and both the Bajau and Bajau Laut identified a number of products that could be sold, including mats, carvings and handicrafts made from natural or recycled materials.

During the project, we looked into the potential for selling handicrafts in tourist shops in Semporna, Kota Kinabalu and at local airports. It was clear from these investigations that significant financial investment would be needed to get such enterprises off the ground. Quality is also an issue because of competition from other producers in Sabah.

One significant barrier is that the great majority of Bajau Laut (the main marine resource users) do not have Malaysian (or other) citizenship and therefore it is difficult for them to embark on independent business or trading initiatives. The status of the Bajau Laut is still being discussed by the Malaysian government.

Handicrafts could be sold directly to visitors as is done in other parts of the world. An advantage of this approach would be that it is much simpler to organize and the local community does not lose out financially to middlemen.

Taking these factors into consideration, it appears that the best way forward would be for craftwork enterprises (especially those involving the Bajau Laut) to be 'home-based', with direct sales, rather than merchandising through tourist and craft shops. There is increasing potential for 'on-site' sale of handicrafts now that more visitors are coming to Semporna and the Tun Sakaran Marine Park.

There are examples from many parts of the world where local communities engage successfully in locally-run craftwork enterprises, often with input from a local NGO and some form of micro-finance to get the project off the ground. It is hoped that Sabah Parks will continue to work with the local community to see if it is possible to take these ideas forward as tourism in the Park expands.

Seaweed farming has been established in the Semporna area for decades and the local community has expressed considerable interest in diversifying into culture and farming of other marine species. Fish farming is one option but currently the required expertise and facilities to culture fish are not available locally. In addition, there are risks from pollution and other environmental impacts that would have to be addressed.

In contrast, culture and farming of marine invertebrates is feasible because there is already a small hatchery in the Tun Sakaran Marine Park in which the invertebrate 'seeds' can be cultured. After an initial period of a few months in the hatchery, the juveniles can then be transferred to ocean nurseries where the stock is maintained by local communities until the animals reach market size. These operations have few environmental risks at the scale proposed for TSMP.

Abalone, sea-cucumbers and giant clams all have potential for the culture and sea-ranching programme. Abalone and sea-cucumbers have a high market price (higher than most fish) and are sold locally and for export. Giant clams are sold in the local market for food but a more economically attractive proposition is to sell juvenile giant clams for the aquarium trade. This option has been researched and a preliminary trial is underway.

Currently the local community does not have the financial resources to buy seed clams from the Sabah Parks hatchery. However, the plan is to subsidise or provide small loans for the start-up phase until enough income is generated for the participants to buy their own juvenile stock for grow-out.

The sea-ranching alternative livelihood programme is dependent on reliable and constant larval production of target species and this is currently the main obstacle for expansion. However, Sabah Parks Marine Unit and hatchery staff are committed to the programme and have laid out a timetable for continued research and development.

BACKGROUND AND RATIONALE

1.1. Why are alternative livelihoods needed?

Key objectives for the Tun Sakaran Marine Park are to:

- Protect, maintain and enhance biodiversity and the health of the environment.
- Maximise opportunities for economic development and ecologically sustainable use of the area and its resources.
- Ensure local people are involved in, and benefit from the creation of the Park.

One of the main challenges in achieving these objectives is to deal with the legacy of decades of heavy exploitation of marine resources. Fishing (including destructive fishing) and gleaning in the area now within the 350km² Tun Sakaran Marine Park has caused stocks of reef fish and other edible species to fall to very low levels, and has drastically reduced breeding populations, especially of high value species such as groupers. This has not only had a negative impact on biodiversity, but is causing hardship to local communities because of increasingly low catches.

In order to achieve the management objectives for the Park, fishing pressure needs to be reduced. This can be done in a number of ways - for example through fishery management measures such as limiting the number of fishermen allowed to use the area, establishing no-take zones where fish stocks can recover and restricting how much fishers can catch and what gear they can use. Implementing any of these measures would inevitably have an impact on communities that currently rely on fishing to make a living. For this reason it is important to investigate alternative or supplementary livelihoods.

1.2. Community focus for alternative livelihoods programme

Marine resources in the Tun Sakaran Marine Park are currently used by communities who live in the Park and also by fishermen who visit from the mainland or neighbouring islands. The long-term plan for promoting recovery of over-exploited resources is to reduce fishing effort by:

- Establishing no-take zones to enable stocks to recover.
- Restricting fishing to communities who live within the Park and
- Encouraging these Park residents to supplement or replace the income gained from fishing by diversifying into other jobs.

The most recent census of Park residents (permanent and temporary) was carried out in 2006 (Wood *et al* 2007), when interviews were carried out with 387 households (over 99% of households present in the Park). The population at this time

stood at 2501, spread between 14 villages and about 100 stilt houses in 19 diffuse clusters on the Sebangkat-Selakan reef top.

Analysis of the socio-economic data showed that 59% of households gave seaweed farming as the main occupation, while fishing came next with 29% and home gardening was the main occupation of 6% of households. Minor categories (in terms of the number of households involved) included cottage businesses (e.g. small shops), live fish trading, seaweed buying and boat building. At this time, no one was employed in the tourism sector - the few visitors who came to the Park were brought in by tour operators based on the mainland.

The approximately 30% of households for whom fishing was the main occupation were virtually all from the Bajau Laut ethnic group and in 2006, this amounted to 114 households (Wood *et al* 2007). There has been some movement within and in and out of the Park since that time, but no significant long-term changes in the number of Bajau Laut households.

Although the full-time fishers are nearly all from the Bajau Laut community, the fishery itself is mainly driven by around 6-10 dealers ('middlemen') who buy from the fishermen and then sell the catch in Semporna or further afield. Investigations carried out in 2010 revealed that a few of the dealers are based on the mainland, but most of them live in the Park.

The Bajau Laut and to some extent the other ethnic groups within the Park also fish to provide food for direct household consumption rather than sale.

The focus for the alternative livelihood programme in the Park therefore needs either to be directly with the Bajau Laut and/or fish dealers or with other communities who might open up job opportunities for the fishing community.



Fisherman bringing in catch in Tun Sakaran Marine Park

1.3. Opportunities

The importance of encouraging and facilitating a shift away from fishing towards environmentally sustainable livelihoods was recognised early on in the Semporna Islands Project, and options were discussed in brief in the Management Plan (Wood, 2001).

It was anticipated that the Park would, in due course, create new job opportunities in various sectors connected to the administration, development, and day-to-day operation of the Park and its facilities. This remains the case, although financial constraints mean that Sabah Parks can only expand the Tun Sakaran Marine Park workforce very slowly. The majority of TSMP staff come from the Semporna area and a few originate from within the Park. However, as far as is known, they are not from the fishing community.

Tourism has considerable potential for direct employment of local people. There has been a significant increase in visitors (mainly divers) to the Park in the past 2-3 years, but the tour operators are based in Semporna and currently employ people from the town rather than the islands. The tourism industry is likely to open up a number of livelihood opportunities, ranging from 'Homestays' to nature or wildlife guiding and selling of craftwork (see Section 2).

Other opportunities lie in existing and planned mariculture operations. Seaweed culture has been established for decades and has expanded in recent years because of high market prices and relatively low entry costs. Culture and farming of marine invertebrates also has potential, and development within this sector was the second theme within the alternative livelihoods part of the current Darwin project. Progress on this is described in Section 3.



Seaweed farming in Tun Sakaran Marine Park

1.4. Community views and aspirations

Consultations and discussions were held with local communities in the Park in order to generate ideas and investigate which alternative or supplementary livelihoods were of interest and might be possible to develop, particularly within the tourism sector.

A workshop held by SIDP and Sabah Parks on Pulau Selakan in 2009 revealed a positive attitude towards alternative or supplementary livelihoods. The Pulau

Selakan community is the most settled and educated within the Park and the majority of households are from the Bajau ethnic group and have Malaysian citizenship. Most of the inhabitants make their living from seaweed farming but were interested in diversifying into other areas - for example in the tourism sector. If this was achieved it could open up opportunities for other communities and ethnic groups living on or close to Pulau Selakan. For example, there are Bajau Laut families here who are currently engaged mainly in fishing but could benefit from local tourism development.

Focus group meetings were held with Bajau Laut communities on the islands of Sibuan, Maiga, Mantabuan, Selakan and Bodgaya in order to find out more about views and issues relating to fishing and alternative livelihoods. The Bajau Laut way of life revolves around the sea and use of marine resources for food and sale, and the community has an inbuilt faith that these resources will always be available. They did however acknowledge that it was much harder to find fish compared to 5 - 10 years ago. The reason they gave for this was that an increase of human population in the TSMP means that more fish are being caught. Whilst they reluctantly accept the original lagoon no-take zone they do not want other areas to be closed or fishing to be restricted in other ways.

Some of the Bajau Laut community expressed an interest in doing other activities/ alternative livelihoods besides fishing. Some commented that with the permission from Sabah Parks, they would like to start a vegetable farm on Bodgaya. But others would prefer to move-out either voluntarily or as instructed by Sabah Parks if fishing is restricted. Migration to new fishing grounds is well-established within the Bajau Laut community.

All the families interviewed said that they welcomed the potential of having tourists visiting their village and would allow visitors in their house as long as they did not create problems and the families received remuneration. The Bajau Laut also commented that TV Companies make lots of money from filming their culture and it would be fair that they also receive a share of these profits.

Visitors and Bajau Laut interacting in the Tun Sakaran Marine Park



2. TOURISM SECTOR

2.1. Introduction

The Tun Sakaran Marine Park has many attributes that make it suitable for tourism development, especially in relation to experiencing and appreciating the natural environment and way of life. Local communities, Sabah Parks and other interested parties generally see this as an appropriate way forward for the park, with potential benefits including:

- Income, economic growth and jobs
- Incentives for conservation
- Opportunity to switch from extractive to non-extractive activities.
- Opportunities to promote education and environmental awareness

Tourism development is currently at a very early stage and consists mainly of diving, snorkelling and picnic trips organised by tour operators in Semporna. However, the Park has many other attributes besides diving which would be interesting and appealing to visitors, such as:

- Diverse and unusual plant life
- Forests suitable for trekking
- Bat and bird caves
- Mangroves suitable for trails
- Birdlife including hornbills, kingfishers and megapodes
- Forest and mangrove animals such as monkeys, otters and monitor lizards
- Different cultures and lifestyles to experience
- People with handicraft and boat building skills
- Local activities to observe (e.g. seaweed culture)
- Opportunity to learn about traditional use of plants (e.g. as medicines)
- Interesting legends associated with the islands

There is considerable potential for local people to be directly involved in the tourism sector and to help visitors experience these activities. Their knowledge of the environment, wildlife and natural resources means they are ideally placed to act as nature and wildlife guides. In addition, there is scope for organising or being part of tourism ventures which allow visitors to learn about the local way of life or visit mariculture ventures such as seaweed farming and giant clam culture.

Feedback from visitors obtained during the '*Willingness-to-Pay and Visitor Survey*' conducted by SIP in 2011 showed a strong interest amongst visitors in the idea of visiting or staying with local communities.

During focus group meetings, Bajau Laut communities living in the Park said that they would welcome tourists visiting their village and would allow them into their

homes as long as the visitors did not cause any problems and they received remuneration. They also commented that TV Companies make lots of money from filming their culture and it would be fair that they also receive some benefits.

There is, however, a real danger that, without guidelines and protocols agreed by all sides, unscrupulous or insensitive tour operators may exploit local communities. Already, some visitors pass by the settlements in the Park for 'photo opportunities', but as yet there is little interaction between visitors and people living in the Park and, as far as we are aware, no direct benefits for the latter. It is vital to avoid the situation where people living in and around the Park become sidelined and income generated by tourism ends up elsewhere, rather than benefiting the local economy.

Alternative livelihoods based around nature and cultural 'experiences' clearly have considerable potential, but considerable planning, investment and training is needed before such ventures can be started. For example, whilst many of the local community have in-depth knowledge of the wildlife and natural resources of the Park, they would need extensive training in language and interpretation skills before any nature guiding initiatives were launched. Trails and look-outs would have to be constructed, either as a private/community venture or through Sabah Parks.

As part of the endeavour to encourage alternative livelihoods within the tourism sector, the Semporna Islands Darwin Project looked more closely at two possible activities that had been flagged up by the local community - Homestay and Craftwork. These are discussed in the following sections.



Bajau Laut community in Tun Sakaran Marine Park, preparing locally-caught fish and shellfish

2.2. Homestay

2.2.1. Background

There are currently no plans for hotels or resorts in the Park, but 'Homestay' would fit with the overall objectives and criteria for tourism development. The community living in the Tun Sakaran Marine Park is one of its unique features, with no other Marine Parks in Sabah having a resident local community. People in the area are naturally welcoming and hospitable and enjoy sharing their culture and traditions with visitors.

At present, visitors to Semporna have no opportunity to experience the local Bajau culture first hand as there are no established Homestay operations in the district (with the exception of an occasional operation on Pulau Bum-Bum).

Homestay was one of the themes of the '*Alternative Livelihoods Workshop*' organized by SIDP at Pulau Selakan in October 2009. Results from the workshop indicated that the community was unanimously in favour of exploring the idea of establishing a Homestay operation on their island.

All Homestays in Sabah must be registered with the Sabah Homestay Association (SHA), and the operators must also participate in a week-long training course prior to being accepted by the SHA. Following the workshop, SIDP obtained the relevant forms, assisted members of the local community to fill them in and submitted the completed forms to the SHA.

Pending available space and funding to join a training course, SIDP invited Puan Ainah Sidek from the Ministry of Tourism, Culture and Environment to give a Homestay Briefing to the Selakan Community. This took place in July 2010 and opened up discussions about issues and next steps. Topics covered by Puan Ainah in her presentation included:

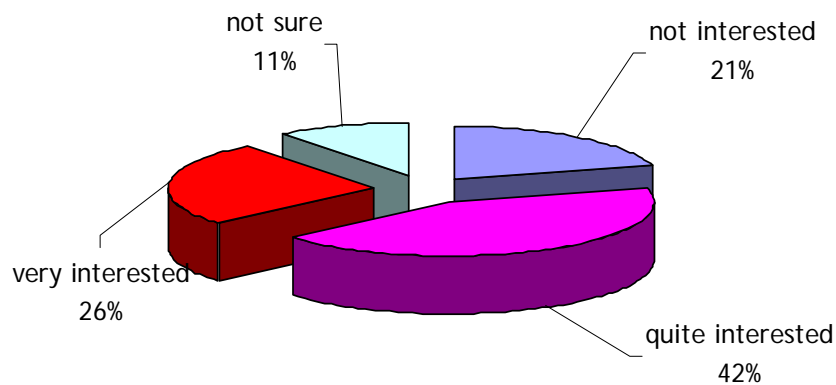
- Objectives and concept of Homestay
- Benefits from Homestay
- The potential and opportunities of Homestay
- Examples of Homestay attractions such as the culture, environment and community activities.
- Examples of Homestay package market for visitors.
- How to apply for Homestay
- Terms of participation and registration guidelines
- Examples of Homestay - house, rooms, toilets, landscape (Pictures)
- Role of the Homestay Coordinator

The sections below provide further information about the potential for setting up Homestay and also outline some of the obstacles that are likely to be encountered.

2.2.2. Market analysis

Homestay in other parts of Sabah is a very popular part of the tourism industry in the state, especially amongst budget travellers. At the moment there are no active Homestays in the Semporna district and a number of visitors have commented that they would like to have the opportunity to experience everyday life of Bajau communities on the islands. Data collected during a survey carried out by SIDP and Sabah Parks in 2011 among 250 visitors to the Tun Sakaran Marine Park revealed that 26% were very interested in the idea of Homestay and 43% quite interested.

Overnight stay in homestay accommodation in Bajau village (n=234)



Interest expressed by visitors (n=234) in Homestay in Tun Sakaran Marine Park.

Selakan Island is currently the most suitable location for Homestay in the Park as the majority of the people living in other locations do not hold Malaysian citizenship. All Homestays in Sabah must be registered with the Sabah Homestay Association and only those with Malaysian citizenship can apply to the Association.

Selakan Island has much to attract visitors, including a lively village community that still maintains its traditional pastimes (mat weaving, music, production of local food and dishes, fishing, pottery). It is also conveniently located within the Park in close proximity to good snorkeling sites, seaweed farms and Semporna town. Other Malaysian families are located on the North side of Bodgaya Island which would provide a spectacular and cleaner, although somewhat isolated, location for Homestay.

2.2.3. Financial aspects

There are financial implications involved in setting up a registered Homestay operation, particularly with regard to improving the infrastructure on the island and cleaning up rubbish that has accumulated over decades. According to Puan Ainah Sidik from the Sabah Ministry of Tourism Culture and Environment, it can be difficult to secure the kind of financing that is needed. Furthermore, all Homestay operators must participate in a week-long training course in either Kota Kinabalu or Sandakan, prior to being accepted by the Sabah Homestay Association. There are costs involved in attending the training course which would need to be covered, although it is possible that some form of sponsorship might be available through the government.

Currently the community resident on Pulau Selakan receive their main sources of income from seaweed farming and fishing which can generate a monthly income of up to RM 900.00. According to the '*Tun Sakaran Marine Park seaweed farming survey and recommendations*' published by SIDP in 2008, 27 of the 33 families on Pulau Selakan are engaged in seaweed farming, with their income supplemented by fishing. In recent months, Universiti Malaysia Sabah have also started up a seaweed farming project in Selakan Island which is providing employment for members of the local community.

Homestay could provide further diversification of livelihoods and additional sources of income and the presence of visitors staying in the Park could have other beneficial knock-on effects on job opportunities for other communities living within the Park.

However, because seaweed farming currently provides reasonably good income for many people on Pulau Selakan, the incentive to expand into Homestay is not very strong, unless costs could be defrayed through sponsorship or grants.

2.2.4. Skills and training needs

The Pulau Selakan community has many existing skills which would complement a Homestay operation. However, participants in the workshop highlighted some gaps in their skills and requested training in the following areas:

- Accounting
- Computer skills
- English language proficiency
- Homestay operations
- First Aid/CPR training
- Boat licence
- Boat captain training and certification

All relevant aspects of Homestay operations would be covered in the training course provided by the SHA. The training involves three days of learning how to

run a Homestay together with visits to established operations such as at Misowalai, Kinabatangan (<http://www.misowalahomestay.com/>).

2.2.5. Other needs

In line with State regulations, Homestay operations have to be registered and must meet strict hygiene and safety criteria.

In order for Homestay at Selakan to become a reality there need to be significant improvements to the infrastructure on the island, including sewage treatment (proper flushing toilets and septic tanks) and repairs to the wooden jetty. There would also have to be a major rubbish clean up on the island and a strategy implemented for proper rubbish disposal in the future. Boats and boat drivers also have to be licensed in accordance with Sabah state regulations.



Pulau Selakan currently has a problem with rubbish and its disposal

2.2.6. Summary impact assessment

Homestay on the island would potentially have positive impacts on the environment because, as part of the development programme, there would have to be improvements in hygiene, rubbish disposal and infrastructure as indicated above.

The presence of visitors interested in experiencing the local way of life could help to maintain cultural heritage and provide opportunities for the sale of handicrafts. It also provides incentives to take care of the environment.

On the other hand there might be some negative social impacts that could affect the community through the introduction of visitors to the island. These include elements of 'cultural pollution' such as exposure to alcohol, inappropriate clothing worn by visitors and financial burdens to maintain upkeep of infrastructure on the island. However, these issues could be dealt with through issuance of guidelines for visitors and proper financial planning.

2.2.7. Progress and next steps

According to Puan Ainah Sidek (Sabah Ministry of Tourism Culture and Environment), Selakan Island has beautiful scenery and other positive attributes but the state of the environment, hygiene and safety are major problems that prevent the Island being introduced as a Homestay destination in the near future.

For the programme to move forward, ways will need to be found to address these issues and provide the required standards. As mentioned above, this will need significant financial investment. Key to the success of Homestay (as exhibited in other Homestays in the country) is the existence of a 'leader' or a 'local champion' within the community who can maintain momentum for the development of the programme within the village.

2.3. Craftwork

2.3.1. Concept

Traditionally, people in Sabah have made a wide range of items for their own use around the home or for fishing, hunting and other purposes. These are made out of various natural materials, ranging from leaves to bamboo, wood, shells and bone. Domestic and international tourism is now well established in the State and has led to a steadily increasing demand for these and other handicraft items as souvenirs.

Craftwork was a theme of the 'Alternative Livelihoods Workshop' organized at Pulau Selakan in October 2009. All of the participants at the Workshop felt that there was potential for enhancing and/or modifying products currently made for personal use and offering them for sale.

During the course of the project, discussions were also held with Bajau Laut communities living in the Park to find out whether there were any types of craftwork that might be marketable and that they would be interested in making and selling to supplement their incomes.

Possible handicrafts identified through these discussions are:

- Mats woven from pandanus leaves ('tepo')
- Wooden carvings of iconic species such as turtles
- Handicrafts made from bamboo or coconut shell
- Handicrafts made from shells
- Handicrafts produced from recyclable materials such as plastic

2.3.2. Market analysis

Currently, the Bajau and Bajau Laut communities resident in the Park are not producing handicrafts for commercial sale, with the exception of some pottery items produced on Selakan Island (photo right) which are bought by a middleman and exported for sale in West Malaysia. Mats are also occasionally sold on an ad-hoc basis.



During the project, we looked into the potential for selling handicrafts in tourist shops in Semporna, Kota Kinabalu, and at local airports. It was clear from these investigations that significant financial investment would be needed to get such enterprises off the ground. There would be costs involved in transporting the items from the islands to the shops and, in addition, retail shops have a high 'mark-up' price making it less of an attractive proposition for local communities. Quality is also an issue. A wide variety of handicraft products are made in Sabah and the retail market is competitive, with the more up-market tourist shops demanding uniform products finished to a high standard.

There is, however, potential for 'on-site' sale of handicrafts now that increasing numbers of visitors come to Semporna and the Tun Sakaran Marine Park. Handicrafts could be sold directly to visitors as is done in other parts of the world. An advantage of this approach would be that it is much simpler to organize and the local community does not lose out financially to middlemen. Manufacturing to a set standard might also be less of an issue because part of the appeal of 'real' locally produced crafts is that they don't always conform to a rigid design.

Preliminary investigations and consultations were carried out by SIDP with local communities and 'people in the business' in order to try and assess whether a market for craftwork exists, and what types of items would be most saleable.

As part of the assessment of the potential for developing craftwork, SIDP arranged a visit to Tun Sakaran Marine Park by Reita Rahim, from Gerai OA, a Kuala Lumpur-based organization which sells handicrafts produced by indigenous communities of the Malay Peninsula. She was of the opinion that the woven pandanus mats produced by the Bajau and Bajau Laut of Semporna have some unique elements (design and materials used) and therefore there should be a market for the mats if they were produced for sale.

However, despite their unique qualities, there are several issues regarding the marketing of mats - in particular their size and price. The traditional mats (see

front cover) are large and would be too bulky for many visitors to consider buying. They are also quite expensive due to the fact that each one requires months to make. One mat (full colour) roughly 1.5m x 2m takes one lady about 2 weeks to produce and involves an outlay cost of at least RM20-30 for materials (dyes and pandanus leaves). The price asked by the Bajau Laut is about RM 350 (£80) which is more than many visitors would want to pay, even though it is more than justified given the amount of time involved in its creation.



Production of mats at Kg Boheybual,
Tun Sakaran Marine Park



SIDP discussed with the Bajau Laut the possibility of producing much smaller 'table mats' that captured the essence of the floor mats but could be produced more cheaply. The community was interested to try this out and the project sponsored a small trial to see what was feasible. Whilst the samples (photo below) that were produced showed it was possible to scale-down the floor mats and also produce different designs, the price was still quite high because even the small mats take many hours to make. We did not proceed to market testing but it is a possible option for development in the future.

Place-mat sized
mats made during
the SIDP trial.



Other handicrafts that were mentioned during the workshop such as carvings and souvenirs made from wood, coconut shell, bamboo, marine shells and recyclable materials such as plastic all have potential. However, investment and training would be needed to ensure that any initiatives undertaken were sustainable and had a good chance of success.

2.3.3. Raw materials and sustainability

Preliminary investigations indicate that there are locally accessible sources of raw materials for production of some crafts.

Currently the community who are producing mats gather the pandanus from their locality or buy the leaves in Semporna market. There are currently no reports of shortages of pandanus, and it can quite easily be cultivated, so ensuring a sustainable supply. Synthetic dyes are usually purchased in Semporna town although traditionally the Bajau Laut would have made dyes from locally sourced plants.



Newly-cut pandanus

'Bubu' fish traps are made from bamboo which is gathered from nearby islands in the Park. Bamboo is generally fast-growing, but a more detailed study would be needed to verify if it is being sustainably harvested.

The community are not doing any wooden or coconut husk carving at the moment but coconut husk is widely available and considered as a waste product, so would be an appropriate material for use in craftwork enterprises.

Shells have been collected and sold in the area for generations but there are indications that many species have been over-exploited and are now less easy to obtain. One of the aims of the alternative livelihoods programme is to move away from the use of marine resources, so it would not be appropriate to encourage the development of craftwork involving shells, unless they were a byproduct of the marine invertebrate culture programme such as abalone (*Haliotis*) shells.

Waste materials such as plastics and aluminium drink cans are in plentiful supply and there is considerable scope for the local community to use these freely available materials to make items such as jewellery, souvenirs and toys. One of the main complaints made by visitors to the Park is about the amount of litter on the islands and in the sea, so it is likely they would support an initiative that put some of the waste to good use.



Recycled metal daisies made from drink cans - an example of how waste items can be used to make saleable items

2.3.4. Next steps

There is clearly potential for local communities in the Park to make and sell handicrafts, especially now that increasing numbers of visitors are coming to the area. Given the large array of craftwork on sale from other communities within Sabah it appears that the best way forward would be to select items that are particularly characteristic of the Semporna area and the Bajau communities.

Reita Rahim has offered to return to TSMP to give some training and perhaps bring some Orang Asli craftspeople from Meh Meri to Semporna for a workshop with the Bajau Laut community. This would be a good opportunity to share ideas and for the Bajau Laut community to learn from the Orang Asli community.

Although the Bajau and Bajau Laut communities have the practical skills required to make handicrafts, and are familiar with bartering and buying / selling goods, most (especially the Bajau Laut) have not had any experience in running a business enterprise. In addition, there is a very high rate of illiteracy amongst the Bajau Laut because they have not had the benefit of education.

Another significant barrier is that the great majority of Bajau Laut do not have Malaysian (or other) citizenship and therefore it is difficult for them to embark on independent business or trading initiatives. In addition, some of them are semi-nomadic, moving from one island to another according to the season and availability of marine and other resources. The status of the Bajau Laut is still being discussed by the Malaysian government and the community is concerned that at any time they might be told to leave the area. Currently they keep away from the mainland and public fish markets and sell their catch through middlemen to whom they are often indebted.

Taking these factors into consideration, it appears that the best way forward would be for craftwork enterprises (especially those involving the Bajau Laut) to be 'home-based', with direct sales, rather than merchandising through tourist and craft shops. There are examples from many parts of the world where local communities engage successfully in locally-run craftwork enterprises, often with input from a local NGO and some form of micro-finance to get the project off the ground. It is recommended that the 'Community Unit' within Sabah Parks works with the local community to see if it is possible to take these ideas forward.

3. CULTURE & FARMING OF MARINE INVERTEBRATES

3.1. Concept

The aim of this programme is to promote alternative livelihoods and reduce pressure on reef resources by training local people to grow and market species such as giant clams, abalone and sea-cucumbers rather than taking them from the wild. Abalone and sea-cucumbers have a high market price (higher than most fish) and are sold locally and for export. Giant clams are sold in the local market for food and a market may exist for export of 'sushi'. A more economically attractive proposition is to sell juvenile giant clams for the aquarium trade. This proposition has been discussed in a separate document (Wood, 2011, Preliminary Business Plan: Farming of Giant Clams for the Aquarium Trade) and is currently being taken forward.

Culture and farming of marine invertebrates is feasible because there is a small hatchery (photo right) in the Tun Sakaran Marine Park in which the invertebrate 'seeds' can be cultured. After an initial period of a few months in the hatchery, the juveniles can then be transferred to ocean nurseries where the stock is maintained by local communities until the animals reach market size.



3.2. Skills and training needs

Skills required for this enterprise fall into two categories. Firstly, spawning of mature adults to obtain the juveniles, and secondly taking care of the juveniles and growing them to market size.

Spawning and culture of eggs, larvae and small juveniles is a skilled job and the responsibility of the hatchery staff, two of whom were sent to the University of the Philippines for training. These were Bobita Golam Ahad (SIDP staff) in February 2009 for training in giant clam culture and Jalil Bin Maipait (SP staff) in July 2010 for training in abalone culture. Costs were covered respectively by the Semporna Islands Project and Sabah Parks.

Training is then required for grow-out of the cultured juveniles. This is semi-skilled work and is ideally suited to communities who are used to hands-on work in the marine environment. Hatchery staff will be responsible for training the local

participants. This is on-going work, with funding provided by Sabah Parks and the CIMB Foundation.

3.3. Summary impact assessment

Whichever species is the focus for the invertebrate culture and sea-ranching enterprise, mature animals have to be obtained from the wild and the likely impact of this has been assessed and is summarized in section a. Other issues revolve around the operation of the hatchery and sea cages and any possible impacts on the environment as discussed in section b.

a) Impact on wild populations

Production of juvenile clams, abalone or sea-cucumbers is based on breeding of adult broodstock that have been obtained either from the wild or from other breeding programmes. The plan is to take minimal quantities from the wild because as the breeding programme proceeds, farmed stock will become available once the animals have grown to maturity. However, it is possible that broodstock might need to be replaced at intervals by collection from the wild.

A proportion of the farmed stock will also be released into the wild, so enhancing existing populations. This should help to offset collection of broodstock.

Giant clams: Mature broodstock currently consists of adults originating from the Boheydulang lagoon or other reefs in the Park, together with a number of farmed specimens of *Tridacna gigas* and *T. derasa* purchased (with CITES permits) from the Philippines in 2008. The reason why these particular species were obtained from elsewhere is that they have been over-exploited in Sabah to the point where insufficient numbers were available for the breeding programme. Further development of the programme will involve *in-situ* spawning of *T. crocea* and other species and will not involve any further collection from the wild.

Abalone: The donkeys ear abalone *Haliotis asinina* occurs on reefs in the Semporna area, including the Tun Sakaran Marine Park. Studies on its population status have not been carried out and fishermen have reported that it is a little more difficult to find them than in the past. However, it has been reasonably easy to obtain sufficient quantities of mature or near-



mature abalone from local fishermen. The number required for the breeding programme is fairly low (several hundred individuals) and is insignificant in relation to the number that are fished for direct sale.

Sea-cucumbers: The species of sea-cucumber most suited for a culture programme is *Holothuria scabra*. All species of commercial sea-cucumber that occur in the Semporna area have been over-exploited and it has proved very difficult to obtain mature individuals for the breeding programme.

b) Impact on the environment

There are various stages in the culture and farming of marine invertebrates and these procedures have been assessed with regard to possible environmental impacts.

Broodstock maintenance

Broodstock of the selected species is kept in the natural environment, as close to the hatchery as possible. The giant clams have been placed on natural sand patches to avoid disturbance to the reef, and care is taken during the spawning procedures not to touch or damage nearby corals. They do not have to be fed and there are unlikely to be any negative impacts from their presence on the reef. In fact they are considered to be beneficial in the reef ecosystem because of their filter-feeding activities that help to keep the water clean. Abalone are being kept in floating cages away from the reef and do have to be fed. The possibility of organic enrichment from faeces and waste food is discussed below.

Hatchery procedures

Fertilisation and larval culture takes place in the hatchery (Marine Invertebrate Conservation Centre) and there are potential environmental risks associated with this phase. Chlorine (chlorox) is used to clean the larval tanks and very small doses of antibiotic (streptomycin) are used for the larval rearing. Chlorox in particular is toxic unless diluted and denatured. Waste water from these procedures is collected inside a sedimentation pool or confinement. Here the particulate matter settles on the bottom of the container and the overflow water passes into a second pool for the next process, which is to remove ammonia. At this stage, the waste water is filtered through a biological filter consisting of sand and coral rubble which contains ammonia and nitrate-eating bacteria (e.g. nitrosomonas bacteria). If necessary, 'aquamat' or 'bio balls' can be added to the second pool to increase the surface area for growth of these useful bacteria.

Grow-out in sea cages

Previous experiments carried out by SIP/SP in the Tun Sakaran Marine Park showed that, for giant clams, benthic cages set out on legs on the seabed are easier to maintain than floating cages. These are deployed in sandy areas so that there is no damage or disturbance to corals. The ones currently in use are 2m long x 1m wide and the clams are placed inside on concrete plates. The concrete plates have to be cleaned to remove accumulated sediment, faeces and pseudofaeces but there is no evidence of build-up of wastes around the cages or anoxic conditions caused by excessive bacterial action. Faeces produced by giant clams are reported to be rich in protein, including zooxanthellae (Ricard & Salvat, 1997) and may be consumed by other animals. For example, adult black damsels

Neoglyphidodon melas feed selectively on giant clam faeces in addition to the soft corals which form the main part of their diet as juveniles (Chan, 2007).

Sea cage in the Tun Sakaran Marine Park containing juvenile giant clams



Abalone are normally reared in barrels suspended on long lines, with about 2,000 abalone in each barrel and 2 barrels taking up 1m² (McShane 1997). Abalone have to be fed with algae, and the organic wastes produced are known to be comparable to the amounts documented for intensive salmon culture (McShane, 1997). Intensive farming would involve 50 or more barrels, but for TSMP communities, 3 or 4 barrels would be sufficient to bring in a good income. There has been no noticeable impact on the back reef habitat where the broodstock are currently being maintained close to the jetty at Boheydulang in an enclosure about 3m x 2m in size.

Guidelines for the local community involved in sea-ranching include recommendations for removing faecal matter and uneaten seaweed and raking the sandy area below the barrels or cages to help prevent any accumulation of organic matter.

3.4. Market analysis

Abalone, sea-cucumber and giant clam may not have the universal appeal of fish, particularly among non-Asian consumers, but they are a highly prized delicacy in many countries. Semporna is well known for its seafood, and demand is likely to increase as more opportunities open up for distribution within Sabah as well on international markets.

Sea-cucumbers are generally sold dried and salted and are already marketed quite widely both in Sabah and overseas. Abalone are mainly sold locally but opportunities exist for wider sales due to the popularity of abalone for sushi. Giant clams currently only have a market in Semporna, where they are sold fresh (flesh only; no shell) for around RM5 / kg (c. £1). There is also potential for export of giant clams fresh chilled for use as sushi. The advantage of this is that relatively

young clams are used (approximately 3-years old i.e. less grow-out time is required) and a higher price is paid than for older specimens (Shang et al, 1991).

An equally attractive economic proposition is to sell juvenile giant clams for the aquarium trade. This has been discussed in a separate document (Wood, 2011, Preliminary Business Plan: Farming of Giant Clams for the Aquarium Trade) and is currently being taken forward. The aquarium trade relies almost entirely on cultured specimens rather than specimens taken from the wild. Depending on species, colour and size, the FOB (free-on-board) export price is between US\$ 6 - 12 per clam (RM 18-36).

3.5. Management and financial aspects

The programme to culture marine invertebrates in Tun Sakaran Marine Park began with giant clams, in an effort to tackle the problem of severe over-exploitation of giant clams in the Park and the Semporna area as a whole.

This initiative has been funded primarily by Sabah Parks through the building of the Boheydulang Giant Clam Hatchery in 2004 (now re-named the Marine Invertebrate Conservation Centre), purchase of necessary equipment and employment of staff. The Marine Conservation Society and Darwin Initiative have also provided technical and financial support through the Semporna Islands Project.

The giant clam breeding programme was established initially for conservation purposes but now provides opportunities for local communities to move away from fishing towards more sustainable livelihoods. Giant clam farming is a low-impact activity that will not only provide jobs for local people but will also bring in revenue from sales that can be re-invested in the giant clam culture programme, so ensuring that conservation efforts are maintained.

Farming of giant clams for sale as aquarium specimens is a financially-viable proposition because costs of research and development have already been covered, so the local community project will not have to take on this burden. In addition, day-to-day running costs of the MICC are supported through Sabah Parks as part of the initiative to promote biodiversity conservation and the alternative livelihoods programme.

Currently the local community does not have the financial resources to buy 'seed' clams or abalone from the Sabah Parks hatchery. However, the plan is to subsidise or provide small loans for the start-up phase until enough income is generated for the participants to buy their own juvenile stock for grow-out.

3.6. Next steps

The sea-ranching alternative livelihood programme is dependent on reliable and constant larval production of target species and this is currently the main obstacle for expansion. However, the Sabah Parks Marine Unit and hatchery staff are committed to the programme and have laid out a timetable for continued research and development.

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