

A specific approach for coral reef conservation and development in SIDS (small island developing states) – the CRISP¹ programme

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SYNOPSIS

A major proportion of coral reefs around the world occur in developing countries. The status of these resources is declining, while these countries simultaneously face major challenges in sustainable development for their people. Reef conservation in SIDS cannot be approached in the same way as conservation in more developed countries, such as Australia or French territories, even though the tools such as Marine Protected Areas (MPA) may be effective for both situations. One of the main differences relies on the widespread inability of government services within SIDS to ensure adherence to legal frameworks aimed at protecting the reef resources from irreversible depletion. The Government of France has invited a wide range of other agencies (South Pacific Regional Environment Programme, Conservation International, WWF, United Nations Foundation and several scientific agencies) to join in developing a programme to address the root causes of coral reef degradation in South Pacific countries. This US\$ 10 million project over 3 years will address a series of issues indicated by Pacific countries, with an emphasis on MPA implementation, integrated coastal management, development of coral reef resources (aquarium trade, ecotourism, marine active substances), rehabilitation of coral reef ecosystems and setting up of a regional reef database. A particular focus will be put on the integration of human factors (anthropology, socio-economics) for insuring the success of the actions developed on the ground, but also in the wide dissemination of the project outputs at a regional level. The integrated approach will rely on the dual involvement of land and marine issues, protection and development issues, community based and highest institutional level issues, existing tools (such as MPAs) and innovative ones (such as environmental information systems EIS, including human and cultural factors).

The project will be focussed in Fiji, Vanuatu, Samoa, Cook Islands, Kiribati, French Polynesia, Wallis and Futuna and New Caledonia with the active involvement of other Pacific countries (Papua New Guinea, Niue, Tuvalu). The concepts behind CRISP draw on the recommendations of the International Coral Reef Initiative and partners, ICRAN (International Coral Reef Action Network) and GCRMN (Global Coral Reef Monitoring Network) and specifically seek to find Pacific solutions to regional problems.

INTRODUCTION

Importance of coral reefs for SIDS

Coral reefs are distributed over 101 countries and territories. They occupy a total surface area of 284,300 sq. km., 29% of which are found in Indonesia and the Philippines (1). These two leading countries associated with the other developing states include 70% of the world's coral reefs.

At the local level, the coral reefs are critical to economic development, in particular through fishing and tourism:

- with a productivity of 10 to 15 tonnes of fish per sq. km. per year (2), the coral reefs are considered to represent 25% of the fisheries potential of all developing countries taken together and provide sustenance to 30 to 40 million

¹ *Coral Reef Initiative for the South Pacific*

² Author's biography

Eric CLUA was appointed as manager for the CRISP programme in April 2005, after a 1,5 year position as scientific and development advisor at the Agence Française de Développement (AFD), which is the major CRISP funding agency. Prior to this experience, the author completed a PhD in coral reefs ecology at the EPHE-CNRS 8046 research unit in Perpignan (France). This ultimate academic training finalised 10 years of field experience, from 1991 to 2000, in the sustainable development of natural resources in the Caribbean and West Africa, as a veterinary surgeon employed by the French Ministry for Foreign Affairs. Eric CLUA also obtained a Master in Business Administration in the French leading school of economics (ESSEC) in 1990.

inhabitants of these countries. It was estimated that 80% of the protein consumed by the people in the Pacific region was derived from reef resources (fish and invertebrates) (3);

- tourism has been gaining in importance: there are currently 2,500 diving centres in 91 countries around the world, catering to 15 million divers visiting the coral reefs each year.

The reefs play a critical role in the protection of littoral and port infrastructure against cyclones. They are also an important component of island identity and part of the cultural heritage of the local peoples—the Polynesian, the Micronesian and, to a lesser extent, the Melanesian peoples.

At the global level, and notwithstanding their small surface area, coral ecosystems represent an immense reservoir of biodiversity that is quite comparable to that of the tropical forest. It is estimated that they are home to 2 million species, including 25% of marine fish species, of which only 10% has been described to date. At the present time, it is thought that this biodiversity can be exploited in search for active substances for use in drug development.

Threats of coral reefs

The coral reefs are coming under increasing threat as 60% are considered to be endangered worldwide, 30% of which are in certain decline. The worst hit area is South-East Asia where more than 80% of the reefs are threatened. This number is only 40% in the Pacific region but, unfortunately, continues to grow (4).

There are a number of local pressures on the reefs:

- public works, mining and deforestation causing soil erosion, increases in water turbidity and accumulation of sediments detrimental to the health of the coral;
- over-fishing due to destructive practices such as the use of explosives and poison;
- uncontrolled tourism (direct damage due to anchoring and diver activities, pollution);
- agricultural and urban pollution leading to accumulation of solid wastes, oxygen depletion and pollution by pesticides and heavy metals;
- extraction of construction materials (coral blocks, sand, etc.), which weakens the reefs and alters the hydrodynamics of the areas concerned;
- destruction of mangroves, leading to a reduction in fish stock renewal capacity, a reduction in ecosystem self-purification capacity and a modification of hydrodynamics.

For example, the cost of the destruction of one kilometre of reef has been estimated between US\$137,000 and 1 million over a 25-year period, considering the economic value of fishing, tourism and littoral protection alone.

However, beyond the more visible and immediate local anthropogenic effects, the growth of the coral reefs is also hampered by the greenhouse effect and global climate change.

Specificity of coral reef problem in SIDS

The limitations of the above described threats are exacerbated in SIDS by the following constraints :

- i) the increasing demography which carries an increasing pressure on the reef resources mainly used for self consumption as shown for reef fishes (5) ; this trend is exacerbated by the disappearance of traditional ways of management of the reef resources (such as taboos and religious beliefs demonstrated as informal no-take zones, even temporary) which were quite effective ;
- ii) the complexity of the pressure on reef resources which implies usual factors such as economic interest or technology available, but also socio-cultural and political aspects which are particularly critical in Pacific SIDS, this factors negatively interfere for the replenishment of food stocks (Fig.1) ;
- iii) the widespread inability of government services within SIDS to ensure adherence to legal frameworks aimed at protecting the reef resources from irreversible depletion.

Such specificities require an adaptive answer to the challenge of sustainable development of coral reefs in SIDS, where most of the solutions implemented in developed countries cannot be applied, mainly because of their prohibitive cost such

as shown by the recent example of the rezoning of the Great Barrier Reef of Australia which cost approximately US\$100 million.

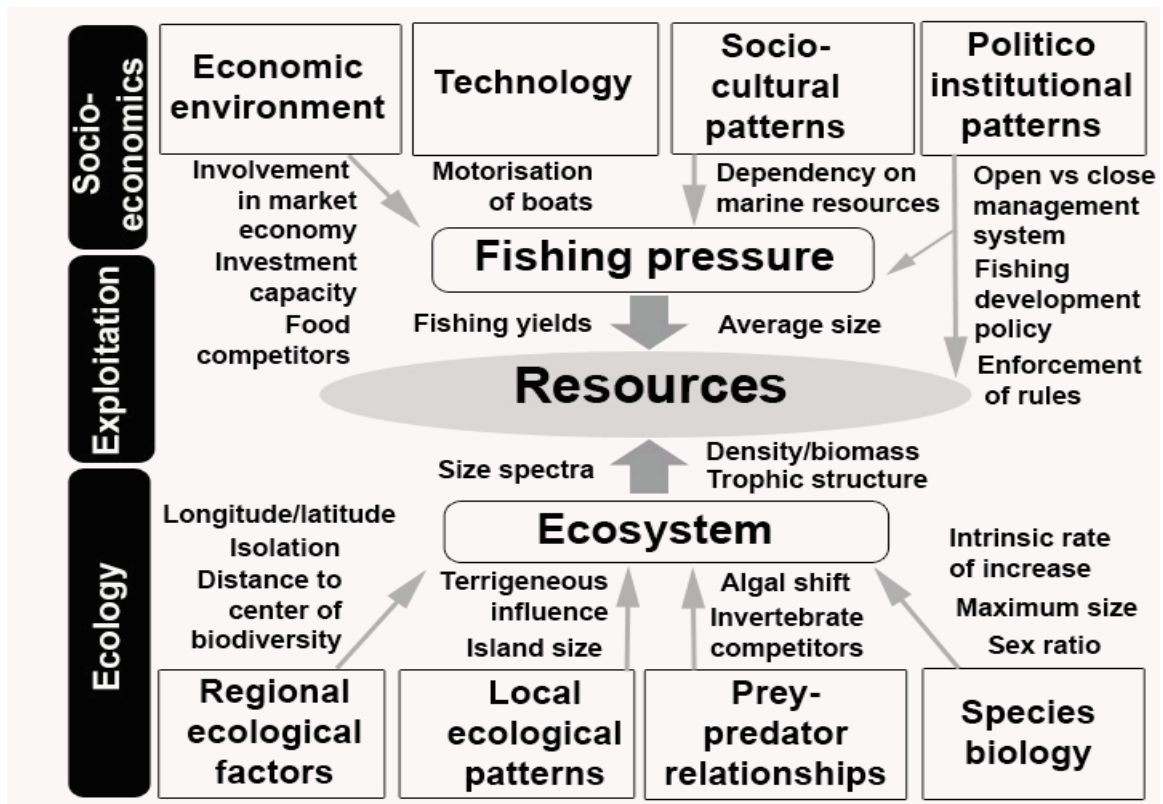


Figure 1 – Main factors influencing the status of fish resources in a reef fisheries system (6)

BACKGROUND

The Pacific has generally been less affected than other regions of the world by human threats or natural destructive events, however the sustainable development of reef resources is a major concern for the majority of SIDS. In order to address the problems that South Pacific SIDS are facing, the Government of France in 2002 invited a wide range of agencies (see below) to join in developing a programme to address the root causes of coral reef degradation in this part of the world.

General Goal

The initiative for the protection and sustainable management of the coral reefs of the Pacific (CRISP), aims to develop a vision for the future for these unique ecosystems and the peoples who depend on them for their livelihood. It seeks to put in place strategies and projects to preserve the biodiversity of the reefs and for the future development of the economic and environmental services that they offer both locally and globally. Further, the initiative is also intended to serve as a vector for regional integration between the developed and the developing countries of the Pacific.

Specific objectives

1. To develop a better understanding of the biodiversity as well as the state and functioning of the coral ecosystems.
2. To carry out actions for large-scale protection and management of the coral ecosystems.
3. To develop the economic potential of the coral ecosystems based on their use value and biodiversity.
4. To disseminate information and knowledge: capacity strengthening and organisation of local, national and international networks in the entire South Pacific.

General approach

The initiative aims to:

- combine cross-cutting networking activities with localised field projects with conservation and economic development objectives;
- combine research, planning and development;
- combine the contributions of different scientific disciplines, including biology, ecology, economics, sociology, law and anthropology;
- be active on all issues (terrestrial and marine) that have a bearing on the reefs, including watershed management and water sanitation;
- avoid creating a new structure but, instead, make financial resources available to already active partners who indicate an interest in developing and consolidating their activities in the spirit of regional cooperation.

Structure and implementing agencies

The initiative comprises three principal components, each with a number of different aspects:

Component 1: Marine Protected Areas and Watershed Management

- (i) Development of marine protected areas (MPAs) as a tool in the protection and development of the biodiversity of the coral reefs and for the sustainability of the economic activities associated with these ecosystems. This component will depend on the intervention of several partners, mostly international NGOs working in the area of environmental protection, including Conservation International (CI), the WWF and IUCN – The World Conservation Union. Their experience and methodologies will be both further developed and integrated at the regional level during the programme. The component should lead to the creation of integrated pilot sites with a long term view to protecting the coral ecosystems at the regional level, networking of the different participants, publication of a field guide and knowledge transfer.
- (ii) Watershed management to check soil erosion, which can be very detrimental to the survival and proper functioning of coral reefs. This aspect of the component will be jointly executed by CI and the International Centre International de Recherche Agronique pour le Développement (CIRAD). Actions in the area of small scale water sanitation, using the appropriate technologies, are also envisaged. In addition to the creation of pilot sites, this aspect of the component should also lead to the development of tools, such as spatial models, for use in risk area assessment and cartography, MPA delineation and management as well as watershed development.
- (iii) Development of comprehensive tools of management of the socio-economics and cultural constraints for the adoption by local populations of the process of implementation of MPAs. This sub-component will be implemented by the *Institut de Recherche pour le Développement* (IRD).

Component 2: Knowledge, restoration and development of coral ecosystems

This component consists of support for knowledge on coral ecosystems in order to better protect, develop and restore the biodiversity. It will take the form of interventions by several participants, principally research organisations, such as the IRD, the *Ecole Pratique des Hautes Etudes* (EPHE) in collaboration with the *Centre National de la Recherche Scientifique* (CNRS), University of French Polynesia, University of the South Pacific as well as some already existing networks, including the *International Coral Reef Action Network* (ICRAN), an off-shoot of ICRI, which will delegate the technical work to the *WorldFish Center* (WFC). The component will focus on :

- (i) the acquisition of terrestrial and marine data and the transfer of research findings allowing the evaluation of ecosystem degradation risks (over-fishing indicators, cartography of erosion risks, etc.),
- (ii) the development of aquaculture activities (for aquarium trade),
- (iii) the development of pharmacological active substances (from the bio-pharmacological and legal standpoint), studying ways to develop the ecotourism potentials of the region,
- (iv) an assessment of the current state of knowledge about the interactions between the increase in atmospheric CO₂ content and the growth of reefs,
- (v) the dissemination of ecosystem restoration techniques and
- (vi) the creation of a meta-database on the coral reefs of the Pacific.

Component 3: Coordination, leveraging, communication and popularisation

This component includes the creation of a coordination unit with a technical assistant from the French Ministry of Foreign Affairs, based in Noumea, who is in charge of the coordination and monitoring of the entire initiative. A second aspect of this component will rely on the *South Pacific Regional Environment Programme* (SPREP), a legitimate and representative institution, for the integration, leveraging and dissemination of information gathered through the initiative (data, approaches, methodologies and know-how).

Means and targets

The government of France launched a call in 2002 for a proposal and co-financing based on a financial input of 5 Million euros. Other donor agencies such as CI, WWF or the United Nations Foundation (UNF) answered positively to reach a global budget of around 9 Millions Euros in 2005 (Table I).

Agencies	Amount (,000 euros)	Status
French Development Agency (AFD)	3,000	Funding agency
French Global Environment Facility (FFEM)	2,000	Funding agency
Conservation International (CI)	1,200	Funding agency, implementing agency
United Nations Foundation (UNF)	900	Funding agency
French Ministry of Foreign Affairs (MAE)	900	Funding agency, implementing agency
WWF- The Global Conservation Organization	500	Funding agency, implementing agency
French Institute of Research for the Development (IRD)	500	Funding agency, implementing agency
French Initiative for Coral Reefs (IFRECOR)	65	Funding agency
Total (,000 euros)	9,065	

Table I – Main funding and implementing agencies of the CRISP programme

The scope of the programme is regional. For on-ground activities, the programme will rely on projects developed in Fiji, Vanuatu, Samoa, Cook Islands, Kiribati, French Polynesia, Wallis and Futuna and New Caledonia with the possible involvement in 2006 and 2007 of other Pacific countries such as Papua New Guinea, Palau, Niue and Tuvalu.

Expected results

It is expected that at the end of the initiative:

- knowledge on coral ecosystems, including the effects of global changes, would have made significant strides toward integrating cross-disciplinary fertilisation and that such knowledge would be available to decision makers and planners;
- significant and carefully selected portions of these ecosystems will become protected or placed under participatory and sustainable management, following a region-level decision on what the priorities should be and according to harmonized procedures;
- the economic potential of these ecosystems will be demonstrated by examples drawn from their principal functions (fishing and aquaculture, tourism, biodiversity development, etc.)
- collaborative networks bringing together citizens of the French overseas territories, developed countries of the Pacific and the small island states of the region will be strengthened or created.

DISCUSSION

The CRISP programme aims at addressing the specific problems of coral reefs management in SIDS and relies on: i) avoid the creation of new structures but, instead, make financial resources available to already active partners who indicate an interest in developing and consolidating their activities in the spirit of regional cooperation; ii) combine research, planning and development through the contributions of different scientific disciplines, including biology, ecology, economics, sociology, law and anthropology; and iii) reserve a privileged position for local populations in the implementation and benefits of the programme.

The central role of the economy

Economics and development of coral reefs will be a specific focus of the programme. Different studies will be conducted within the component 1 on the economic value of coral reefs in one hand and the development of ecotourism (including the setting up of an ecocertification system for hotels and diving operators) on another. A sub-component of component 2 will specifically develop bioprospection in 3 states based on the collection of benthic invertebrates. A complementary output of this action will propose an improvement of the legal framework in Pacific SIDS in order to ensure suitable economic benefits for countries where active molecules can be found. Another subcomponent will develop the setting up of demonstration sites and operations of capture, farming and trade of reef fish larvae for the aquarium and aquaculture markets.

Networking

The CRISP will act as a vector for regional cooperation and integration. The status of Pacific islands regarding the means available for financing the protection and sustainable development of coral reefs is quite heterogeneous. We can distinguish three categories: firstly the small island developing states; secondly the island belonging to developed countries such as Hawaiï (USA) or New Caledonia (France); and thirdly the independent islands benefiting from the direct support from developed countries such as Cook Islands (New Zealand), Guam (USA) or French Polynesia (France). The cooperation between the different categories is quite limited and the support that each island receives at different scales, comes rather through a top down process from developed countries to developing ones rather than through transversal dynamics between Pacific islands facing the same kinds of problems. The management of coral reefs falls under the mandate of the South Pacific Regional Environment Programme (SPREP) which is based in Apia (Samoa) and encompasses 21 countries and territories members. The SPREP plays a transversal role between the three above mentioned categories, but until recently the involvement of developed islands in SPREP was far from effective and the lack of transfer of knowledge from these islands toward their demanding neighbours is obvious. In parallel, a large panel of international NGOs (such as WWF, CI, TNC, etc.) work in the Pacific and have developed their own networks. In such a complex context, the CRISP programme will avoid the creation of any new structure but will contribute to strengthening the existing ones and giving them means for improving their functioning. There will be, however, a merging between existing networks with a positive effect being the prevention of duplication of similar initiatives or projects from different implementing agencies that will be pushed into more cooperation.

The knowledge transfer

A critical phase of the programme will rely on the delivery by SPREP to its member countries of the outputs of CRISP in terms of management tools, success stories, scientific and technical information. A specific strategy for the sharing of adapted information and media to different targets such as political representatives, technical departments and local communities, will be set up in the course of the programme. At the political level some actions will be run in order to better address an improved management of coral reef resources throughout the sustainable development policies and plans of the SIDS. At the technical level, a specific and strong emphasis will be put on the implementation of adapted tools regarding the lack of means and technical capacities of the SIDS. These tools, such as indicators for fisheries management or reef monitoring, will be tested in several islands providing real conditions for an objective assessment of their effectiveness before any development at a large scale. Regarding the needs to sensitise local communities to a sustainable use of the reef resources, south pacific traditions and customs will be taken into consideration in order to implement innovative ways of knowledge transfer (oral sessions, theatre representations, etc.).

Focus on local communities ownership

If one of the objectives of the programme aims at transferring some know how from developed countries toward developing states, many solutions for reef conservation that proved their efficiency in the context of wealthy economies cannot work in an absence of available funds. Therefore, the human factor is considered as critical for the success of processes developed through the CRISP programme, and the decentralization of management of coastal marine resources remains a global objective. In the context of the general inability of governmental services to ensure the enforcement of legislations, the capacity building activities will primarily concern local communities and actors and then public structures. The best compromise between traditional (not seen anymore as useless or obsolete) and more modern management practices will be determined, which supposes a better understanding and involvement of cultural constraints in the implementation of management processes. A specific subcomponent of component 1, the GERSA project (Fig. 2), will contribute to the optimization of anthropologic and cultural factors in order to ensure ownership from local communities. The concretization of the GERSA intervention will bring up adapted environmental information systems (EIS) not to be used (only) by scientific or governmental structures such as in developed countries, but by local communities and

stakeholders. Such systems will integrate different sources of information. Amongst them, some are classical such as natural risks assessment or the status of the resources, but others are quite innovative such as the indigenous cadastre.

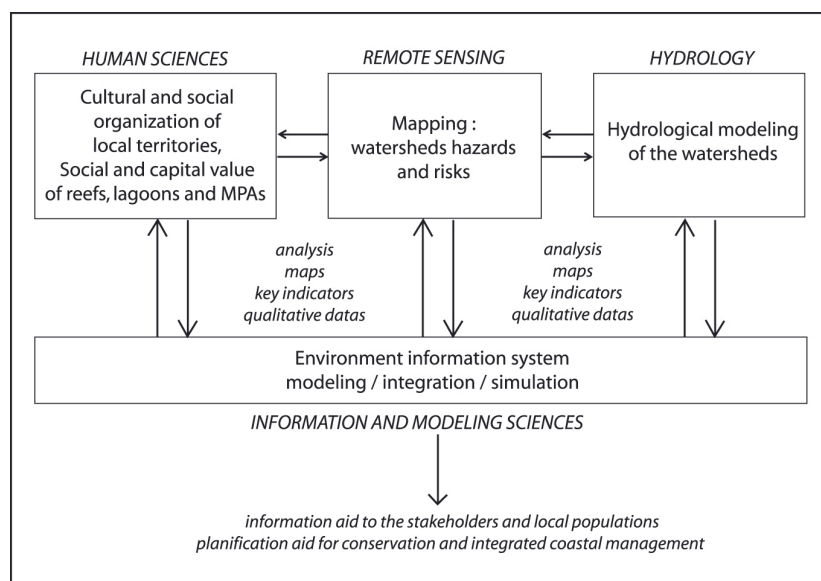


Figure 2. Principal steps of the process developed by the GERSA project in order to ensure the provision of critical information for local management of natural resources by local communities and stakeholders.

CONCLUSION

- 1- The CRISP programme is facing the challenge of providing support to the implementation of existing solutions and to the setting up of innovative ones in order to improve the general capacity of ensuring the sustainable development of coral reefs in Pacific SIDS;
- 2- A strong emphasis will be put on cooperation with existing and related projects and initiatives in the South Pacific implemented by organizations such as IUCN³, TNC⁴, NOAA⁵, etc. which are not yet part of the process; such cooperation should be boosted by the framework for discussion provided by the ICRI⁶;
- 3- A 3 years programme appears too short for such a purpose and efforts should be anticipated for raising a new set of funds for a second 3-year phase;
- 4- The problem of sustainable development of coral reefs in the Pacific SIDS is not specific to that region and any innovative solution tested throughout the CRISP could be easily exported ;
- 5- As the majority of coral reefs are found in developing countries, the problem of their sustainability and resilience in order to ensure their role at a global level (in addition of their single importance for local populations), should be properly addressed by developed countries, which is not the case at the present time.

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⁴ The Nature Conservancy

⁵ National Oceanic & Atmospheric Administration (USA)

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