MARINE COMMUNITY MONITORING PROGRAM

REVIEW OF COMMUNITY MONITORING PROGRAMS IN AUSTRALIA AND OVERSEAS

Literature Review: MCB-1/2000

A collaborative project between CALM, Marine Conservation Branch and Australian Marine Conservation Society, Western Australian Branch

A project funded by Coastwest/Coastcare

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1999

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ACKNOWLEDGEMENTS

Many thanks to everyone that provided information on community monitoring programs for this review.

This report may be cited as:

Grubba T (2000). Review of community monitoring programs in Australia and overseas. Report: MCB – 1/2000 (Marine Conservation Branch, Department of Conservation and Land Management, 47 Henry St., Fremantle, Western Australia, 6160).

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SUMMARY

The Department of Conservation and Land Management (CALM) and the Australian Marine Conservation Society of WA (AMCS WA) with funding from Coastwest/Coastcare are developing a manual of methods entitled the *Marine Community Monitoring Manual.* The development of this manual is the second stage of a three-stage program known collectively as the *Marine Community Monitoring Program.*

This review assesses 39 existing community monitoring programs from Australia and overseas. The review focuses on an assessment of the generic components of all monitoring programs including program objectives, program coordination, methods, data storage and presentation. Recommendations will be used to develop the *Marine Community Monitoring Manual.*

The following recommendations were made:

- program objectives need to be simple and directly relevant to the concerns and interests of the community, science and management;
- a program facilitator is required to coordinate the *Marine Community Monitoring Program*;
- where possible methods should be based on existing previously trialed methods;
- method complexity must be compatible with the capabilities of the community participants and the level of support and training provided; and
- data should be stored in a database that is accessible and can be queried by everyone (eg internet) with in-built mechanisms to produce standard outputs (feedback) that are up to date, understandable and useful to the community (eg summary tables, graphs and figures posted on the internet).

The review also identified existing community monitoring programs, which can be linked directly to the *Marine Community Monitoring Program* such as Reef Check and Dragon Search.

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1 INTRODUCTION

1.1 THE CALM/AMCS WA MARINE COMMUNITY MONITORING PROGRAM

The Department of Conservation and Land Management (CALM) and the Australian Marine Conservation Society of WA (AMCS WA) are developing a package of monitoring tools to enable community groups to participate in the conservation and management of their local marine environments.

The *Marine Community Monitoring Program* will provide a framework to integrate the expertise and extensive local knowledge of community groups in Western Australia through the development of marine life identification tools, standardised monitoring methods, data management procedures and community training programs.

The program is being developed in three stages:

STAGE 1:

1. the development of a CD-ROM-based marine identification guide entitled *Marine Life in Western Australia*. The CD-ROM identifies about 400 of the most common marine fauna and flora from Western Australia's coastal waters.

STAGE 2:

1. review of existing community monitoring programs in Australia and overseas;
2. workshop assessment of community concerns and interests;
3. production of a manual of methods entitled *Marine Community Monitoring Manual.* The manual contains user-friendly monitoring methods;
4. field trials to trial and refine the manual and methods;
5. development of data-handling procedures to facilitate information flow to and from community groups through the establishment of a marine data page within CALM's internet site, NatureBase; and
6. identification of priority community monitoring projects throughout Western Australia.

STAGE 3:

The development and implementation of a community-based training program that will focus on training community groups to use the tools developed in stages 1 and 2.

The program is currently in the second stage of development. The recommendations presented in this review will form the basis for the development of the *Marine Community Monitoring Manual.*

2 AIM

Assess existing community monitoring programs in Australia and overseas in order to make recommendations on:

- how to develop an effective community monitoring program;
- monitoring methods that can be adapted for inclusion in the *Marine Community Monitoring Manual*;
- the design and development of a database for the *Marine Community Monitoring Program*; and
- existing community monitoring programs, which could be linked to the *Marine Community Monitoring Program.*

3 SCOPE OF THE REVIEW

A sample of 39 community monitoring programs from Australia and overseas were reviewed. See Table 1 for a list of the programs reviewed. There are thousands of monitoring programs in existence, for example a 1994 EPA report (National Directory of Volunteer Environmental Monitoring Programs) documented approximately 517 community based monitoring programs in the US alone. It is felt that this review within its allocated time covers the majority of major programs and a suitable cross section of smaller programs. As the

Marine Community Monitoring Program develops additional monitoring programs will be identified and reviewed and appended to this review.

Table 1. Australian and overseas community monitoring programs reviewed

COMMUNITY MONITORING PROGRAM	SUMMARY
Western Australia	
Adopt a Beach (MESA)	Beach litter surveys in Western Australia carried out by schools.
Australian Marine Conservation Society of WA: Mussel Survey- Cockburn Sound	Surveys for the introduced marine pest, the green-lip mussel and other species carried out by SCUBA divers.
Bunbury Community Monitoring	Water quality monitoring in Bunbury using electronic data loggers deployed and retrieved by volunteer SCUBA divers.
Fisheries WA	Surveys of recreational fishing efforts throughout WA carried out by Fisheries WA Officers.
HMAS: Seagrass monitoring	Development of a seagrass 'health' monitoring in Cockburn Sound for community groups.
CALM: Marine turtle tagging project	Reporting of sightings of CALM tagged turtles.
Oceanwise: Tantabiddi	Baseline survey of the coral reef in the lagoon at Tantabiddi in the Ningaloo Marine Park carried out by community group.
Pocillopora Reef, Rottnest Island: Marine monitoring 1992-1998	Monitoring coral reef (*Pocillopora*) 'health' at Rottnest Island. Program completed.
Ribbons of Blue	Water quality monitoring throughout WA carried out by schools.
Seagrass (*Posidonia*) monitoring and transplantation in Princess Royal Harbour	Monitoring seagrass 'health'/recovery in Albany carried out by a high school.
South Fremantle Senior High School Marine Studies	Monitoring seagrass 'health' in Cockburn Sound and Monitoring coral reef health and *Drupella* status at Coral Bay, in the Ningaloo Marine Park. Both carried out by high school.
AUSTRALIA	
Adopt a Beach TRALAC	Beach litter surveys on Tasmanian beaches.
Australian Marine Conservation Society: Monitoring of key underwater sites in Moreton Bay, Bundaberg and Kangaroo Island	Development of coral/temperate reef 'health' monitoring in Queensland, and South Australia.
Beach Clean-up Survey	Beach litter surveys on Queensland and Victorian beaches carried out by schools.
Cod Hole Survey	Monitoring Potato Cod abundance and human activities at the "Cod Hole" by a commercial dive operator.
COTSWATCH	Monitoring Crown of thorns starfish (COTS) in Queensland. Program has expanded to other states and even internationally.
Darnley Community Survey	Monitoring catch information (dugong, turtle etc.) carried out by indigenous communities.
Australian Marine Conservation Society: Dragon Search	Reporting of sightings of Seadragons, throughout the southern states of Australia.
Hinchinbrook Region Marine Mammal Survey	Reporting of sightings of marine mammals in the Hinchinbrook region in Queensland.
Introduced Marine Pests Program	Development of monitoring programs for detecting introduced marine pests throughout Australia.
Islander-Based Seafood catches in the Torres Strait Protected Zone	Monitoring catch information (dugongs, turtles, fish etc.) carried out by project officers.
Kuku Yalanji turtle and dugong management and education project: Queensland.	Monitoring catch information (dugong, turtle etc.) carried out by indigenous communities.

The Victorian Seagrass Workshop	Development of a network of ecosystem and issue based monitoring (seagrass) by workshop participants (community, managers, and science).
Reef Watch South Australia	Monitoring/surveys of temperate reefs in South Australia.
Seagrass Watch: Queensland	Monitoring/surveys of seagrass communities in Queensland.
Torres Strait Traditional Fishing	Monitoring catch information (eg. dugongs, turtles, fish etc.) carried out by indigenous communities (hunters, fishers and schools).

Table 2. cont.

COMMUNITY MONITORING PROGRAM	SUMMARY
OVERSEAS	
Aquanaut: Reef Base	Monitoring coral reef 'health' in southeast Asia.
Butterflyfish as indicators of change on Indo-Pacific reefs	Development of a monitoring program using butterflyfish as indicators of coral reef 'health'.
Coral Diver Network	Documenting coral reef 'health' worldwide using internet based reporting forms.
Coral Cay Conservation	Monitoring/surveys of coral reefs around the world carried by paying volunteers.
Coastal Resources Management Project (CRMP)	Monitoring/surveys of coral reefs, seagrass and mangroves health and collects social data carried out by coastal villages in Indonesia.
EPA Volunteer Estuary Monitoring	Water Quality monitoring across the US.
Frontier- Tanzania Marine Project	Monitoring coral reef 'health' in Africa carried out by paying volunteers.
Global Coral Reef Monitoring Network (GCRMN)	Monitoring coral reef 'health' globally.
Rapid Assessment Protocol (RAP)	Monitoring coral reef 'health' in the Atlantic and Gulf regions.
Reef Check	Monitoring coral reef health globally on an annual basis.
Reef Environmental Educational Foundation (REEF)	Monitoring coral reef fishes in south eastern US and the Caribbean.
Reefwatch II – The Indian Ocean Coral Reef Fish Monitor	Monitoring coral reef fishes in the Indian Ocean region
Seasearch UK	Monitoring/surveys of temperate reefs in England

3.1 METHODS

The review identified and gathered information on a sample of 39 monitoring programs from Australia and overseas through literature searches, previous knowledge of existing monitoring programs, consultation with experts and internet searches. The internet was used extensively as many monitoring programs (in particular large and/or overseas monitoring programs) had internet sites. This proved to be one of the most effective means of gathering information and the internet addresses are provided in the reference section.

For each monitoring program reviewed information was gathered on standard generic components (refer to Table 2). In some instances it was difficult to gather all the information required due to poor documentation and difficulties contacting monitoring programs. Information relating to the methods used, data storage and

data presentation were given a high priority. The information collected is stored at the Marine Conservation Branch and is documented in a database.

As the *Marine Community Monitoring Program* progresses any new community monitoring programs identified will also be reviewed and appended to this report.

Table 2. Generic components of monitoring programs.

- organisations;
- program objectives;
- program coordination;
- program location;
- type of community;
- monitoring methods;
  - Data sheets
  - Data submission
- training and support;
- database; and
- how the data is used.

4 REVIEW OF EXISTING MONITORING PROGRAMS

The following section summarises the generic components from which monitoring programs were reviewed. Table 1 lists the monitoring programs reviewed and appendices 1-3 provide detailed information on each of the generic components (Table 2) for each monitoring program reviewed.

4.1 ORGANISATIONS

The review identified a broad range of groups involved in the development and implementation of community monitoring programs in Australia and overseas including:

- government agencies eg science and management;
- education institutions eg universities, high schools and primary schools;
- conservation groups eg Australian Marine Conservation Society (AMCS);
- recreational clubs eg dive clubs;
- tourist operators eg charter boats;
- indigenous communities eg aboriginal communities; and
- specifically formed organisations eg Reef Check.

4.2 PROGRAM OBJECTIVES

The review found that community monitoring programs address a broad range of issues of interest and concern to the community, science and managers on local and global scales (Table 3). Approximately 28% of the monitoring programs reviewed monitored coral reef 'health', approximately 19% monitored fish associated with coral reefs and approximately 13% monitored seagrass 'health'.

Objectives can be divided into three broad categories that include:

- objectives with clear links to science and management eg COTS Watch;
- objectives with clear links to the education and development of skills of the community eg monitoring conducted by educational facilities and indigenous communities; and
- objectives that focus on providing mechanisms for the community to self-manage their resources eg monitoring conducted by indigenous communities.

Some monitoring programs did not clearly define their objectives, making it difficult to determine their relevance to the community, science and management agencies.

Table 3. The focus of the monitoring programs reviewed.

beach litter	3 programs
introduced fauna	2 program
water quality	3 programs
seagrass	6 programs
turtles and dugongs	6 programs
coral reefs	13 programs
fish	9 programs
starfish	1 program
temperate reefs	4 programs

4.3 PROGRAM COORDINATION

The review identified that all successful community monitoring programs had a high level of coordination. Programs were coordinated by at least one program coordinator, who was either part-time/full-time and volunteer/paid. In cases where program coordinators were not present, monitoring programs tended to preform poorly in the long run. Many of the larger monitoring programs (eg Reef Check) had regional coordinators in addition to a central coordinator. Interactions between program coordinators and participants was dependent on the spatial scale of the monitoring program and funding. In smaller programs or where there were regional coordinators the coordinators were able to work in the field with participants. Larger programs primarily interacted with participants using tools such as the phone, internet and e-mail.

The typical roles of program coordinators include:

- development and continued refinement of monitoring programs eg methods;
- recruitment of participants to the monitoring program;
- providing support to participants;
  - development and provision of training
  - development and provision of support materials eg manuals.
- data management; and
  - development and maintenance of database
  - ensuring data quality
  - entering data into the database
- providing outputs or products.
  - development and maintenance of internet sites
  - summarising monitoring data
  - production of reports
  - responding to requests from the community, management and science that require data or other information

4.4 TYPES OF COMMUNITY INVOLVED

The review identified a broad range of community groups and individuals that participated in monitoring programs including:

- local residents;
- indigenous communities;
- people on holiday;
- recreational boating groups;
- recreational diving groups;
- recreational fishing groups;
- nature study enthusiasts and collectors;
- conservationists;

- scientists;
- teachers and students;
- local government; and
- commercial tour operators.

The type of community group/individuals involved in monitoring programs is dependent on a number of factors that include:

- program objectives that are of relevance or interest;
- compatibility of the methods to the skills, experience and resources of the participant;
- costs involved including time and money;
- location of the monitoring programs; and
- level of training and support provided to participants.

The majority of monitoring programs targeted specific types of participants (using the factors listed above). For example monitoring programs run by *Coral Cay Conservation* use participants able to travel to sometimes remote sites, commit to a least a month, cover their own costs and have the necessary skills and marine experience. Another example is *Reef Check* that requires participants to have some level of prior experience in marine science and SCUBA qualifications. Some programs however were aimed at a more broad range of participants including programs such as *Dragon Search* that used basic methods compatible with the average community member.

4.5 MONITORING METHODS

The review found that in general the methods used by community monitoring programs are derived from standard and commonly used monitoring methods. Table 4 lists some of these standard methods. In most cases the methods are adapted to meet the requirements of the program (ie objectives, location, participants and data quality). The complexity of methods varies from the simple, which can be carried out by an average community participant with basic skills and minimal support and/or training to complex, which can only be carried out by participants with specialised skills, experience and increased support and/or training. The majority of monitoring programs used methods that required participants with some skills (eg SCUBA qualifications) and an understanding of the marine environment. Programs provided support in the field through coordinators and written materials.

Table 4. Methods used in the reviewed monitoring programs

VARIABLE	METHOD
beach litter	transects.
introduced marine pests	presence/absence surveys.
water quality	electronic loggers, chemical test kits and secchi disk.
seagrass	quadrats, transects and aerial photography.
turtles, dugongs	surveys and logbooks completed while hunting.
coral reefs	line intercept transects, point transects and visual estimations.
fish	random swims and transects.
starfish	presence/absence surveys using random swims.
seadragons	presence/absence surveys.
temperate reefs	point transects and visual estimations.

4.6 DATA SHEETS

The review identified the following methods for recording data collected during monitoring:

- data sheets down loaded/printed from internet sites and manuals;
- data sheets supplied in the field by a program coordinator;
- data sheets incorporated into brochures eg COTS WATCH;

- electronic data sheets on the internet which can't be down loaded/printed and must be completed electronically eg Coral Diver Network;
- electronic spread sheets; and
- electronic equipment such as loggers for recording data eg temperature logger.

The complexity of data sheets varied from a basic single page up to four data sheets for one single site.

Collected data was typically submitted to a program coordinator who checks data quality, stores the data and works the data up. Submission of collected data was by the following mechanisms:

- mail in data sheets (some pre-paid);
- fax in data sheets;
- on-site collection of data sheets when a program coordinator was present;
- submission of electronic data sheets posted on an internet site; and
- data sheets submitted using e-mail.

4.7 TRAINING AND SUPPORT

The review identified that monitoring programs provide varying levels/types of support and training for participants. The type and level provided is dependent on:

- level of program funding;
- number of program coordinators;
- complexity of methods used; and
- participant skills and experience.

The types of training and support that are provided include:

- brochures and information sheets eg Dragon Search;
- manuals;
- workshops;
- pre-field briefings eg AMCS WA Green lip mussel survey;
- training programs which varied from hour long briefings to week long courses with classroom and field components eg Coral Cay; and
- field supervision/support by a qualified team leader eg Reef Check.

4.8 DATABASE

The review identified a number of different mechanisms for the storage of community monitoring data including:

- hard copies of submitted data sheets;
- electronic spreadsheets; and
- databases.

The type of data storage used was dependent on:

- level of program funding;
- program size;
- program coordinators or other participants with the expertise to develop databases; and
- access/links to existing compatible databases.

Programs with databases generally provided limited community access to their database due to the location of the database, limited query facilities, and data security. The majority of programs only permitted the program coordinator and/or trained participants to enter data into databases. A few monitoring programs provided access to databases on the internet but the databases had limited query facilities and were complex to navigate. One monitoring program *Reef Base* sold copies of it's database on CD-ROM which are up-dated annually.

4.9 HOW THE DATA IS USED

The review identified a variety of uses for community monitoring data collected including:

- raw data passed onto management and science agencies or other groups such as universities;
- raw data entered into a database and made accessible to the community via CD-ROM, internet and computer terminals at specific locations;
- publication of reports containing data from community monitoring programs. Distribution of reports was typically limited;
- raw data and data summaries posted on internet sites;
- data is shared with other community monitoring organisations; and
- raw data was stored and not used.

In general data was not presented in a format appropriate and useful for the general community. There was also a lack of feedback in regards to how the data was being used and applied to management. In some cases the data collected was of a sensitive nature and not release to the general public. For example releasing data on the site location of sensitive species could expose them to increased pressures. In some cases data was lost over time.

5 RECOMMENDATIONS

Refer to Table 5 for a summary of the recommendations made for the *Marine Community Monitoring Program.*

5.1 PROGRAM OBJECTIVES

The review highlighted the fact that many monitoring programs set objectives without consulting all relevant groups (community, science and management). This can lead to the collection of data of limited use in managing the marine environment. In addition many of the programs set objectives that can only be achieved using complex methods that target specific community participants and/or require varying levels of training and support.

The Marine Community Monitoring Program is unique in that it will act as an "umbrella" for a variety of individual monitoring programs under the headings of physical, biological and social. The objectives for each individual monitoring program need to be developed in consultation with all relevant groups (community, science and management). This consultation process will ensure that the objectives set address high priority management issues and thus avoid monitoring for the sake of monitoring. The consultation process will also assist in setting objectives that can be achieved using simple methods that provide quality data and exclude the need for extensive training, previous skills/experience and specialised equipment. This is of particular importance in the initial stages of the *Marine Community Monitoring Program*, prior to the development of a training program.

5.2 PROGRAM COORDINATION

The review highlighted the essential roles that program coordinators play in community monitoring and how the absence of a coordinator can reduce the effectiveness and long-term success of monitoring programs. As the *Marine Community Monitoring Program* will include a number of programs it will have a greater complexity than any of the reviewed programs. It is therefore essential that the *Marine Community Monitoring Program* has a program coordinator.

The potential roles of a program coordinator for the *Marine Community Monitoring Program* include:

- development of new monitoring programs in consultation with the community, science and management;
- promotion of the program;
- providing support and training for participants;
- database management; and
- providing feedback to the community, science and management.

The only alternative to a program coordinator is the development of mechanisms that would automate the program. For example an internet based approach where software programs replicate the coordinator's role. However the review did not identify any of these mechanisms. This is probably due to issues such as development costs, insuring data quality, reduced flexibility, and inability to develop and add new methods. As the initial funding for the *Marine Community Monitoring Program* is limited it is unlikely that these mechanisms can be developed in the first few years.

Table 5. SUMMARY OF RECOMMENDATIONS

PROGRAM OBJECTIVES	• objectives need to be simple, focusing on the concerns/interests of the community, scientists and managers; and • objectives need to be achievable using simple methods compatible with the capabilities of the community and the level of training/support provided.
PROGRAM COORDINATION	A program coordinator whose roles include: • facilitating the development of new monitoring programs; • liaison with existing monitoring programs; • providing support and training; • collection of data sheets and data entry; • data entry and database maintenance; • production of reports based on monitoring data; and • providing feedback to the community.
TYPE OF COMMUNITY	• includes a broad range of the community through the use of a broad range of simple methods and providing support (coordinator) and training (manual and training program).
MONITORING METHODS • **Data sheets** • **Data submission**	Methods need to: • be based on existing community monitoring methods; • be developed in consultation with the community, science and management; • provide data that addresses program objectives which in turn address priority issues and concerns of the community science and management; • be simple and compatible with the capabilities of the community (experience, skill and equipment) and the level of support and training provided; and • maintain a high data quality.
TRAINING AND SUPPORT	• training program must be established if more complex methods are to be used; • comprehensive manual; • program coordinator to provide additional support; and • access to suitably qualified help.
DATABASE	• database located on the internet for increased accessibility; • community can query the database; and • database is upgradeable; • no direct entry of data into the database by the community.

HOW THE DATA IS USED	• the program must provide feedback to science and management agencies in the form of raw data or reports; • community access to the raw data via the internet; • community able to query the database via the internet; • raw data summarised regularly into a form (eg graphs) that can be understood by the community; • community informed of how the data is being used and what are the management outcomes; and • program facilitator provides additional feedback.
LINKING WITH OTHER PROGRAMS	• link to other community monitoring programs that have compatible program objectives, methods and database.

5.3 MONITORING METHODS

The review identified that the majority of monitoring programs use standard methods that have been adapted for use by the community. Generally the monitoring programs had a development phase during which methods were modified, trialed and refined. The method used and any type of modification is dependent on the monitoring objectives, data quality, capabilities of the participants and the level of support/training provided. To minimise costs and to avoid "re-inventing the wheel" the *Marine Community Monitoring Program* should use methods already adapted, trialed and refined by existing community monitoring programs. This approach provides the means to select methods best suited to the *Marine Community Monitoring Program* including the use of simple methods that provide quality data that is relevant to management priorities, and can be carried out by the majority people with minimal support and training required.

5.4 TRAINING AND SUPPORT

All of the programs reviewed, provided some level of training and support which was dependent on the complexity of the methods used and the capabilities of the community involved. The *Marine Community Monitoring Program* is developing training and support mechanisms through a CD-ROM "Marine Life in Western Australia" (stage 1), the *Marine Community Monitoring Manual* (stage 2) and a training program based on the previous tools (stage 3). The *Marine Community Monitoring Program* should initially include simple methods that can be carried out with minimal training and support.

5.5 DATABASES

The review identified a variety of data storage mechanisms of which databases are the most effective. In general the databases reviewed provided limited access to the community and limited functionality (ie query functions) which is probably due to a lack of funding and database expertise.

The *Marine Community Monitoring Program* database will be complex as it acts as an "umbrella" for a variety of smaller databases (one for each monitoring program). The development of each sub-database needs to take into account the program's objectives to ensure that in-built queries and outputs are relevant. The query facilities must be simple and fast for community use. The database needs to be located where it has the greatest accessibility. The review identified the internet as the most effective mechanism for making data and information available to the community. The review also identified the issues relating to data entry including database security and data quality, and it is recommended that data entry is initially restricted to trained individuals eg program coordinator. The database should be up graded as new methods are developed.

5.6 HOW THE DATA IS USED

In general the review identified few community monitoring programs that provide adequate up to date feedback that was easily accessible and in a format easily understood by the community. In many cases collected data was not used as it was not relevant to high priority issues, or if there were concerns about data quality.

The *Marine Community Monitoring Program* needs to ensure that the data collected is relevant to the high priority issues and concerns. This is best achieved by developing program objectives in consultation will all relevant community, science and management groups. The program objectives must be achievable using methods that are compatible with the capabilities of the community and the level or training/support provided to ensure data quality is of a high standard. Data collected need to be summarised in a format that the average community member can understand, eg summary tables, graphs and maps. Summary data should be made available through such mechanisms as the internet or through the program coordinator. Raw data should also be made available and the community kept informed on how science and managers are using their data.

5.7 LINKING/COMPATIBILITY OF OTHER MONITORING PROGRAMS

The review identified a variety of community monitoring programs that could be linked to the *Marine Community Monitoring Program* (Table 6). These programs have objectives and methods that are relevant to the issues, concerns and capabilities of communities in Western Australia. By linking to these programs the *Marine Community Monitoring Program* can take advantage of methods that have already been trialed. Linking also permits the exchange of data, providing the opportunity for greater data distribution and use. For example by linking to *Reef Check* the data collected in Western Australia can be used not only on a local level but also on an international level. This provides the opportunity for the community to compare their local reefs to other reefs worldwide.

Table 6. Community Monitoring Programs Reviewed: Programs that could be linked with the CALM/AMCS Program and/or use similar methods.

TITLE OF MONITORING PROGRAM	POSSIBLE LINK	METHODS
WESTERN AUSTRALIA		
Adopt a Beach (MESA)		YES
Australian Marine Conservation Society of WA: Mussel Survey-Cockburn Sound	YES	YES
Bunbury Community Monitoring	YES	YES
Fisheries WA	YES	YES
HMAS: Seagrass monitoring	YES	YES
CALM: Marine turtle tagging project	YES	
Oceanwise: Tantabiddi		YES
Pocillopora Reef, Rottnest Island: Marine monitoring		YES
Ribbons of Blue	YES	YES
Seagrass (*Posidonia*) monitoring and transplantation in Princess Royal Harbour	YES	YES
South Fremantle Senior High School Marine Studies	YES	
AUSTRALIA		
Adopt a Beach TRALAC		YES
Australian Marine Conservation Society: Monitoring of key underwater sites in Moreton Bay, etc.	?	?
Beach Clean-up Survey		YES
Cod Hole Survey		YES
COTSWATCH	YES	YES
Darnley Community Survey		
AMCS: Dragon Search	YES	YES
Hinchinbrook Region Marine Mammal Survey		YES
Introduced Marine Pests Program	YES	YES
Islander-Based Seafood catches in the Torres Strait Protected Zone		
Kuku Yalanji turtle and dugong management and education project: Queensland.		
The Victorian Seagrass Workshop		YES
Reef Watch South Australia	YES	YES
Seagrass Watch: Queensland		YES
Torres Strait Traditional Fishing		
INTERNATIONAL PROGRAMS		
Aquanaut: Reef Base	YES	YES
Butterflyfish as indicators of change on Indo-Pacific reefs		YES
Coral Diver Network		YES
Coral Cay Conservation		
Coastal Resources Management Project (CRMP)		
EPA Volunteer Estuary Monitoring		YES
Frontier- Tanzania Marine Project		
Global Coral Reef Monitoring Network (GCRMN)		
Rapid Assessment Protocol (RAP)		YES
Reef Check	YES	YES
Reef Environmental Educational Foundation (REEF)		YES
Reefwatch II – The Indian Ocean Coral Reef Fish Monitor		

Seasearch UK		

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Personal communication with Neil Summer

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http://www.wrc.wa.gov/ribbons

Seagrass (Posidonia) monitoring and transplantation in Princess Royal Harbour
Personal communication with Mr. Jim Kneale

South Fremantle Senior High School Marine Studies
Personal communication with Mr. Alan Wolfe

AUSTRALIAN COMMUNITY MONITORING PROGRAMS

Adopt a Beach TRALAC
Loose sheets: Adopt-a-Beach Litter survey

Australian Marine Conservation Society: Monitoring of key underwater sites in Moreton Bay, Bundaberg and Kangaroo Island
Australian Marine Conservation Society Bulletin, Winter 1997. Vol. 20 No. 1.

Beach Clean-up Survey
Loose information sheets

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Great Barrier Reef Marine Park Authority (GRMPA) Report
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APPENDIX 1: WESTERN AUSTRALIAN BASED COMMUNITY MONITORING PROGRAMS

ADOPT A BEACH (MESA)

ORGANISATION:

Marine Education Society of Australasia (MESA) (Seaweek 1993).

PROGRAM OBJECTIVES:

Adopt a Beach was developed specifically for schools and aims to:

- help develop feelings, interests, attitudes and values associated with the enjoyment and understanding of the marine environment;
- teach students how to act responsibly when using the marine environment;
- show students how to carry out environmental investigations in a scientific manner;
- carry out a successful sample collection using appropriate sampling techniques;
- categorise marine rubbish samples based on predetermined criteria;
- collect and record appropriate field data;
- determine sample weight by following a prescribed method;
- tabulate field data in an appropriate form;
- interpret and analyse data; and
- identify marine environment problems and issues.

PROGRAM COORDINATION:

MESA coordinates the program on a state level while school teachers coordinate their individual programs.

PROGRAM LOCATION:

Sandy beaches easily accessible to participating school in Western Australia.

TYPE OF COMMUNITY INVOLVED IN THE PROGRAM:

School aged children and their teachers.

MONITORING METHODS:

A beach close to the school is selected, as the beach needs to be visited at least once a season (autumn, winter, spring and summer) within a specific time frame.

The equipment required for monitoring include:

- scales (grams and kilograms),
- mesh bag for use with scales, and
- gloves.

Initially a beach profile is made that records the following data:

- location and approximate area of the beach;
- what council/shire is the beach located in;
- does the beach get cleaned? If so, by whom;
- the number of bins located near the beach, how often are they emptied?;
- is the beach located within a Marine Park; and
- what factors may affect rubbish on the beach (hotels, industry, shops, etc..).

At the beach all the litter within a 100 meters long transect that runs parallel to the shoreline (between waters edge and vegetation line) is collected. Collected litter is sorted into standard categories and litter items are cleaned to remove sand and excess water. The items in each category are counted and weighed and the information recorded onto a data sheet. The collected litter is then disposed of or recycled.

DATA SHEETS:

Data sheets are basic collecting information on the type of litter from beach users and fishing sources. There is one data sheet for each season.

DATA SUBMISSION:

The completed data sheets are submitted by the school teachers to the MESA coordinator by the due dates for each season.

TRAINING/SUPPORT:

An information sheet describing the method is distributed to teachers and additional support can be obtained from the MESA coordinator.

DATABASE:

Submitted data are entered into a database however there are no details available on the database and it not known if the database still exists.

HOW THE DATA IS USED:

MESA tabulate and analyse the data submitted and provide this to other groups including Fisheries, EPA, and local authorities. MESA provide feedback to the participating schools informing them of the state of the coast, and any major problems that have been highlighted.

AMCS WA MUSSEL SURVEY – COCKBURN SOUND

ORGANISATION:

Australian Marine Conservation Society of WA (AMCS).

PROGRAM OBJECTIVES:

To monitor the presence (abundance and distribution) or absence of the Green lip mussel an introduced marine pest in Cockburn Sound. Also to monitor the presence/absence of other introduced marine pests such as Sabella fan worms, European shore crab, Spider crab and a species of isopod.

PROGRAM COORDINATION:

Coordinated by Australian Marine Conservation Society of WA (AMCS WA) volunteers.

PROGRAM LOCATION:

Cockburn Sound, Western Australia.

TYPE OF COMMUNITY INVOLVED IN THE PROGRAM:

AMCS WA volunteers with SCUBA qualifications.

MONITORING METHODS:

Pairs of SCUBA divers are allocated sites within Cockburn Sound which they are required to survey. At each site the dive pair complete a survey form including site information, presence/absence of green lip mussels and other introduced marine pests. If green lip mussels are observed the divers record the numbers, distribution and density of the mussels. A detailed mud map was also drawn showing the exact location of the mussels at the site. Samples of the mussels were also collected, so that their identification could be rechecked at a latter time by experts.

DATA SHEETS:

A basic data sheet that includes information sheets describing each of the target introduced species.

DATA SUBMISSION:

Data sheets were submitted on the day to the program coordinator.

TRAINING/SUPPORT:

Participants were required to identify the green lip mussel as well as other introduced species. Divers were trained in identification and survey techniques during a pre-dive meeting using photocopied extracts of identification books that were included with the data sheets. Surveys were conducted over one day with time allocated between dives and a debriefing session to discuss the survey and provide additional support.

DATABASE:

Not known

HOW THE DATA IS USED:

Not known

BUNBURY COMMUNITY MONITORING

ORGANISATION:

Bunbury Dolphin Discovery Centre.

PROGRAM OBJECTIVES:

To assess water quality and increase public local industrial awareness of the water quality of Koombana Bay.

PROGRAM COORDINATION:

Bunbury Dolphin Discovery Centre.

PROGRAM LOCATION:

Koombana Bay, Bunbury, WA.

TYPE OF COMMUNITY INVOLVED:

Volunteer divers collect and maintain data loggers in the Bunbury area. Visitors to the Dolphin Discovery Centre are also encouraged to make their own reading from the centre.

MONITORING METHODS:

Volunteer divers place and retrieve the data loggers. The Marine Divison of CSIRO and School of Environmental Sciences at Murdoch University down load the data from the loggers and analyse the data. The Data loggers measure:

- water clarity;
- water temperature, salinity and level of dissolved oxygen;
- nutrient levels, turbidity and chlorophyll a; and
- sediment analysis.

DATA SHEETS:

No data sheets

DATA SUBMISSION:

Retrieved loggers are submitted to CSIRO and/or Murdoch University

TRAINING/SUPPORT:

No training is required

DATABASE:

No database

HOW THE DATA IS USED:

The results being obtained from the main study will be incorporated into public and education programs for local residents, school children and visitors to the Koombana Bay area. This involves the display of results on signs.

FISHERIES WESTERN AUSTRALIA

ORGANISATION:

Department of Fisheries Western Australia.

PROGRAM OBJECTIVES:

The primary objective is to estimate the recreational catch and effort.

PROGRAM COORDINATION:

Fisheries Western Australia.

PROGRAM LOCATION:

Throughout Western Australia, wherever Fisheries WA officers patrol. In particular Carnarvon, Coral Bay, Exmouth and Denham.

TYPE OF COMMUNITY INVOLVED:

Fisheries WA officers while they are on patrol.

MONITORING METHODS:

Field officers have a standardised survey sheet, which they use to ask and collect information from the public. This information includes details on fish species caught, fishing activities. This information is referenced to the Fisheries WA grid system.

DATA SHEETS:

A standardised survey form

DATA SUBMISSION:

Completed survey forms are sent to the regional offices that then pass the information onto the Head Officer

TRAINING/SUPPORT:

Not needed.

DATABASE:

Survey information is entered into a database and GIS.

HOW THE DATA IS USED:

The data is used by Fisheries WA for management purposes.

HMAS SEAGRASS MONITORING

ORGANISATION:

Department of Defence, Defence Estate Organisation.

PROGRAM OBJECTIVES:

There are three main objectives:

- monitor beaches and seagrasses as part of Royal Australian Navy's management plan;
- align the efforts with regional environmental management; and
- involve the broader community in monitoring and management.

PROGRAM COORDINATION:

Environmental Officer -Stirling for the Defence Estate Organisation.

PROGRAM LOCATION:

Western side of Cockburn Sound (Garden Island side of the sound) in waters managed by the Defence Estate Organisation. In the future is proposed that the program will also include other areas within Cockburn Sound and also other areas in the region.

TYPE OF COMMUNITY INVOLVED:

The program has initially identified two groups that can become involved a dive club and a team of Navy clearance divers. In the future it is proposed that the program will expand to include any interested community groups.

MONITORING METHODS:

CSIRO conducted a pilot study in order to evaluate the different methods that could be used and the design of the monitoring program. The pilot study focused on monitoring seagrass quantity and quality. The following were included in the pilot study:

- percentage cover of seagrass measured by line intercept transects (quantity; expressed as a proportion);
- percentage cover of seagrass measured by point intercept transects (quantity; expressed as a proportion);
- density of seagrass shoots measured by counting the number of shoots in 0.0625 m2 quadrats (quantity);
- density of seagrass based on an ordinal classification determined by the distance between shoots (quantity);
- presence of epiphytes on seagrass leaves estimated from videotapes of transects (quality); and
- presence of seagrass flowers estimated from videotapes of transects (quality).

Monitoring will be carried using random transects, which provide more general results, are easier to carry out, and are used by other studies in the area. The disadvantages being the decrease in the ability to detect small temporal changes.

The pilot study recommended that both point and line intercept transects are suitable for monitoring percentage cover of seagrasses with minimal need for training. Measuring density by counting shoots is more difficult and does require training. Videotaping to evaluate epiphyte cover is also viable. The study suggested that 10 to 15 replicates of quadrats and transects would be required, however this is dependent on the resources of the group carrying out the monitoring.

DATA SHEETS:

Not known at this stage

DATA SUBMISSION:

Collected data would be submitted to the Environmental Officer -Stirling for the Defence Estate Organisation. In turn this data would be passed onto other management agencies such as the Department of Environmental Protection (DEP).

TRAINING/SUPPORT:

Some level of training would be required.

DATABASE:

Not known at this stage

HOW THE DATA IS USED:

Data would be used by the Environmental Officer -Stirling for the Defence Estate Organisation in the management of Defence Estate waters. The data would also be passed onto the DEP which are also carrying out seagrass monitoring in Cockburm Sound.

MARINE TURTLE TAGGING PROJECT (CALM)

ORGANISATION:

Wildlife Research Centre of the Department of Conservation and Land Management.

PROGRAM OBJECTIVES:

To obtain information on the four species of marine turtles, including life history, distribution etc.. This is being done with a tagging program.

PROGRAM COORDINATION:

Wildlife Research Centre.

PROGRAM LOCATION:

North west coast of Western Australia

COMMUNITY PARTICIPATION:

Anyone.

MONITORING METHODS:

The program relies on incidental observations that are submitted by the community. If a tagged turtle is sighted dead or alive then the observer is asked to record the tag number, date, time location and other details. If the turtle is dead then the tags can be removed and sent back to CALM.

DATA SHEETS:

No data sheet available.

DATA SUBMISSION:

Incidental reports are submitted to CALM offices, which are then relayed to the Wildlife Research Centre.

TRAINING/SUPPORT:

A series of information brochures are available that explain the program, give contact details. The brochure also gives information I how to identify the four species of turtles.

DATABASE:

Reports are entered into a database.

HOW THE DATA IS USED:

Various scientific papers and management documents.

OCEANWISE

ORGANISATION:

Oceanwise (non-profit organisation).

PROGRAM OBJECTIVES:

To add to existing scientific knowledge and provide sufficient information for management authorities to develop more comprehensive plans concerning activities at Tantabiddi, Ningaloo Marine Park.

PROGRAM COORDINATION:

Oceanwise, with assistance from CALM and other local groups.

PROGRAM LOCATION:

The lagoon adjacent to Tantabiddi in the Ningaloo Marine Park.

COMMUNITY PARTICIPATION:

Oceanwise members

MONITORING METHODS:

A pilot research program that uses transect and quadrat surveys to collect information on the 'health' of the benthic habitat.

DATA SHEETS:

Not known.

DATA SUBMISSION:

Not known.

TRAINING/SUPPORT:

Not known.

DATABASE:

Not known.

HOW THE DATA IS USED:

The data was used in a report that was submitted to CALM and local groups.

POCILLOPORA REEF, ROTTNEST ISLAND: MARINE MONITORING 1992-1998

ORGANISATION:

The monitoring program was initially carried out by Dr. Gary Kendrick in 1992 for the Rottnest Island Authority (RIA). In 1995 the SCUBA club, SCUBA II became involved by taking over the photographic monitoring. SCUBA II was involved in photographic monitoring up to 1998.

PROGRAM OBJECTIVES:

To monitor the level of mechanical damage to the dominant coral species, *Pocillopora damicornis* impacts resulting from deterioration of water quality, eutrophication, pollution, or increased turbidity of the water column.

PROGRAM COORDINATION:

SCUBA II

PROGRAM LOCATION:

Pocillopora reef at Parker Pt., Rottnest Island.

TYPE OF COMMUNITY INVOLVED:

Local dive club members with experience in marine science and SCUBA qualifications.

MONITORING METHODS:

The design of the monitoring program was relatively simple, using a series of control sites and treatments sites. There where a number of problems associated with the project, especially in the period prior to SCUBA II becoming involved. Prior to SCUBA II involvement monitoring was done on an irregular basis. Comparisons of SCUBA II photographs and previous photographs were difficult due to the lack of consistency in the angle and location of the camera positions during photography.

The initial methods that were initialised by Dr. Kendrick were modified by SCUBA II to permit volunteers to carry out the monitoring tasks. This included the improved demarcation of the site. This involved the replacement of original markers (metal rods) with star-pickets capped with PVC and engraved with the site numbers. Additionally bearing and distance between monitoring sites were made to facilitate relocation. SCUBA II designed and constructed a stand, so that the height could be accurately determined. Laminated photographs of previous surveys were also used to allow the photographer could more accurately reproduce the photograph.

SCUBA II after taking photographs, which were on slide film, then scanned onto a photo CD and imported. SCUBA II then produced a paper outlining the study, giving a limited rundown of the conclusions of the study, and highlighting the need for scientific quantitative assessment of the coral and the water characteristics.

DATA SHEETS:

Not known.

DATA SUBMISSION:

Not known.

TRAINING/SUPPORT:

SCUBA II emphasises the point that although some members have good solid backgrounds in marine biology, or a good understanding of general scientific methodology, limited what could be achieved.

HOW THE DATA IS USED:

SCUBA II produced a report outlining the study. SCUBA II felt that the analysis or the quantification of observations was outside of the scope of the project.

RIBBONS OF BLUE

ORGANISATION:

Ribbons of Blue a program run by the Water and Rivers Commission (WRC).

PROGRAM OBJECTIVES:

Monitor (sample) bodies of water including streams, drains, dams, rivers, gauging stations, estuaries, wetlands or bores.

PROGRAM COORDINATION:

Ribbons of Blue program is coordinated by the WRC which has regional coordinators throughout the state.

PROGRAM LOCATION:

Western Australia

TYPE OF COMMUNITY INVOLVED:

Community groups and schools working in conjunction with local government authorities, catchment management authorities and Landcare Conservation District Committees.

MONITORING METHODS:

A Ribbons of Blue manual is available that details all the methods and equipment used. All the equipment required for monitoring water quality is available from the program. Some of the equipment that is used is expensive.

The variables that can be monitored include:

- Temperature
- pH
- Conductivity
- Turbidity
- Total Phosphorus
- Nitrates
- Chlorophyll ‘a’
- Dissolved oxygen
- Faecal Coliform
- Total solids
- Amonia

The program also includes:

- Habitat survey
- Invertebrates
- Native Trees
- Birdwatch
- Frogwatch

DATA SHEETS:

The manual does not provide data sheets for water quality monitoring, however there are data sheets for Birdwatch, frogwatch etc..

DATA SUBMISSION:

Collected data is submitted to the regional coordinators which enter into a state-wide database. Some coordinators specialise in data management.

TRAINING/SUPPORT:

The majority of the training is provided in the manual. The manual includes sections on:

- Testing equipment and methods
- Fieldwork
- Interpretation of results
- Field biology

- Classroom activities
- Action planning
- Teacher information and contacts.

The regional coordinators also provide information and assistance.

DATABASE:

There is a State-wide database. This database is maintained by specific regional coordinators

HOW THE DATA IS USED:

The data collected is used for educational purposes by the teachers. The data is also used by agencies such as the Water Authority, the Waterways Commission and the Department of Agriculture.

SEAGRASS (*POSIDONIA*) MONITORING AND TRANSPLANTATION IN PRINCESS ROYAL HARBOUR.

ORGANISATION:

North Albany Senior High School.

PROGRAM OBJECTIVES:

The main aim of the program is to promote the conservation of seagrass habitats in the Albany region by:

- monitoring *Posidonia* density and distribution in parts of Princess Royal harbour;
- transplanting *Posidonia* rhizomes and monitoring re-colonisation of quadrats;
- educating students on the benefits of healthy seagrass meadows through field studies; and
- publishing results in the local and state newspapers and local community radio.

PROGRAM COORDINATION:

North Albany High School science teacher liaising with marine scientists.

PROGRAM LOCATION:

Princess Royal Harbour in Albany.

TYPE OF COMMUNITY INVOLVED:

Students from North Albany Senior High School.

MONITORING METHODS:

The distribution of live *Posidonia australis*, *P. sinuosa*, and *Amphibolis antarctica*, were mapped out. This was done using 50 X 50 meter quadrats in depths from 0.3 - 2.0 meter at LLWM. The corners of the quadrat were defined by star pickets. Between the Star pickets a 50-meter line was laid with 1 meter increments. Participants using a 50-meter tape then mapped the distributions on waterproof paper, by taking measurements.

DATA SHEETS:

The distributions of seagrass were mapped on waterproof paper.

DATA SUBMISSION:

The data is submitted to the Albany Waterways Management Authority (AWMA)

TRAINING/SUPPORT:

The High School teacher coordinates the training and support of the participating students.

DATABASE:

It is not known whether North Albany High School or AWMA have a database.

HOW IS THE DATA USED:

Students use the data in the reports that they produce. The data is submitted to AWMA and to marine scientists who work up the data. Results are also released to the local and state media.

SOUTH FREMANTLE SENIOR HIGH SCHOOL MARINE STUDIES

ORGANISATION:

South Fremantle Senior High School marine studies department.

PROGRAM OBJECTIVES:

- The health of seagrass communities in Cockburn Sound; and
- *Drupella* (coral predator) monitoring study at Coral Bay

PROGRAM COORDINATION:

Coordinated by Alan Wolfe (high school teacher) who is the Marine Studies coordinator at the South Fremantle Senior High School.

PROGRAM LOCATION:

The school is involved in two monitoring programs Cockburn Sound and Coral Bay.

TYPE OF COMMUNITY INVOLVED:

High school students.

MONITORING METHODS:

- The seagrass studies involve the estimation of seagrass cover by using quadrats.
- The *Drupella* studies also involved quadrats to determine *Drupella* density and coral health.

DATA SHEETS:

Not known

DATA SUBMISSION:

Not known

TRAINING/SUPPORT:

Training and support is provided by the teacher and curriculum.

DATABASE:

Not Known

HOW THE DATA IS USED:

Not Known.

APPENDIX 2: AUSTRALIAN BASED COMMUNITY MONITORING PROGRAMS

ADOPT A BEACH (TASMANIAN RECYCLING AND LITTER AWARENESS COUNCIL)

ORGANISATION:

Tasmanian Recycling and Litter Awareness Council (TRALAC).

PROGRAM OBJECTIVES:

Collected data to help develop solutions to end the serious and dangerous problem of rubbish that threatens the marine coastal environments.

PROGRAM COORDINATION:

TRALAC team coordinators.

PROGRAM LOCATION:

Sandy beaches in Tasmanian.

TYPE OF COMMUNITY INVOLVED:

Anyone.

MONITORING METHODS:

The beach characteristics are recorded (eg gradient, shore type and any recent events). The different types of litter are counted (in groups of five) as they are collected. At the conclusion of the survey the participant records numbers of bags filled, estimated length of beach cleaned. Also reported are toxic/hazardous substances that were seen. Also reported are oil spills, sewerage-sourced material and stranded, entangled wildlife.

DATA SHEETS:

Basic data sheet.

DATA SUBMISSION:

Completed data sheets are submitted to the TRALAC team coordinators at the end of the survey. The coordinators submit the completed data sheets to TRALAC.

TRAINING/SUPPORT:

No training is required but team coordinator will provide support.

DATABASE:

Not known

HOW IS DATA USED:

Not known

TORRES STRAIT TRADITIONAL FISHING

ORGANISATION:

Joint program of the Australian Fish Management Authority (AFMA) and CSIRO Research.

PROGRAM OBJECTIVES:

The program monitors the traditional and island based fisheries of the Torres Strait within the Torres Strait Protected Zone (TSPZ).

PROGRAM COORDINATION:

Coordinated in the field by fisheries officers.

PROGRAM LOCATION:

Torres Strait Protected Zone.

TYPE OF COMMUNITY INVOLVED:

Torres Strait Islander communities involved in hunting/fishing (including adults and school aged children).

MONITORING METHODS:

Monitoring was carried out using surveys that collected information on catches: fish. Clams, trochus, beche-de-mer, lobster, pearl shells, turtle and dugongs. Surveys were carried out regularly by fisheries officers and locals. The information collected included:

- type of animals;
- size and weight of animals (in the case of turtles and dugongs);
- the methods used in capture;
- how the catch was going to be used;
- number of animals;
- the sex of the animal (in the case of turtles and dugongs); and
- where the fishing occurred

Fisheries officers collected information from direct observation when visiting an island and by interviewing fishers for the periods when they are off the island.

There was also a method that was developed for school children and included counting the numbers of dugongs caught and recording their sex and if females were pregnant.

DATA SHEETS:

Data sheets consisted of surveys/questionnaires that were filled in by the fisheries officers and fishers. School children recorded their information on a wall calendar using stickers. Stickers had drawings of dugongs, turtles (male, female, and pregnant females).

DATA SUBMISSION:

Completed surveys were handed to fisheries officers whom returned them to the head office. Fisheries officers visited the schools to collect their data.

TRAINING/SUPPORT:

The fisheries officers worked closely with local communities. They carry out on-site training and education on monitoring catches. Fisheries officers visited school and gave presentations.

DATABASE:

Not known

HOW IS DATA USED:

The data collected is used by AFMA and CSIRO to assist the indigenous communities in the management of their dugong and turtle resources.

AUSTRALIAN MARINE CONSERVATION SOCIETY. MONITORING OF KEY UNDERWATER SITES IN MORETON BAY

ORGANISATION:

Australian Marine Conservation Society (Head Office).

PROGRAM OBJECTIVES:

To develop and establish protocols, a uniform methodology and a database for ongoing monitoring of key underwater sites at Moreton Bay. The principal objectives of the program include

- utilise the help of recreational divers who dive in Moreton Bay;
- encourage public participation in the monitoring of the marine environment;
- detect change in the various habitats/species using a standardised method that records diver observations;
- make the program uncomplicated to the recreational diver while still gathering useful scientific data;
- disseminate information back to the divers as soon as possible in order to maintain interest and develop a greater community knowledge base about benthic organisms and fish species in Moreton Bay; and
- provide a method that will be useful and interesting to volunteer divers around Australia.

PROGRAM COORDINATION:

A working group composed of marine scientists developed the program. AMCS were the coordinating group.

PROGRAM LOCATION:

The program was developed and tested in Moreton bay in Queensland.

TYPE OF COMMUNITY INVOLVED:

The initial development of the program involved a working group that included participants from a number of organisations. The program is aimed at using participants with SCUBA qualifications.

MONITORING METHODS:

Initially the techniques for benthic monitoring were based around using underwater video. A 50 m transect was laid out of the substrate and then videoed. After initial trailing the methods will be fined tuned. Fish surveys were also carried out but its doesn't mention the techniques used.

DATA SHEETS:

Not known

DATA SUBMISSION:

Not known

TRAINING/SUPPORT:

Not known.

DATABASE:

Not Known

HOW IS DATA USED:

Not Known.

INTRODUCED MARINE PESTS PROGRAM

ORGANISATION:

This program has been developed by a steering committee with representatives from Fisheries WA, CALM, CSIRO: Centre for Research on Introduced Marine Pests (CRIMP), and the Introduced Marine Pests Program, Marine Group (IMPP).

PROGRAM OBJECTIVES:

- disseminate general information; and
- develop a community reporting system.

PROGRAM COORDINATION:

CRIMP

PROGRAM LOCATION:

Australia wide.

TYPE OF COMMUNITY INVOLVED:

The program is aimed at a wide range of community groups including industry and recreational groups as well as social beach users.

MONITORING METHODS:

The monitoring methods would possibly focus on presence/absence, density, etc. Monitoring would focus on selected species (known or potential highly threatening species) with a range of technical information sufficient to raise community awareness and stimulate identification and reporting.

DATA SHEETS:

Not known

DATA SUBMISSION:

Completed data sheets would be submitted by mail or e-mail.

TRAINING/SUPPORT:

Information sheets would be distributed that include:

- description (including photographs);
- ID features (to separate it from similar or endemic species);
- known or potential distribution (maps);
- habitat information;
- known and potential impacts; and
- contact information.

The program will also be linked in with the CD-ROM identification guide and the CRIMP internet site.

DATABASE:

The data sent to CRIMP will be deposited into a flat file database and will trigger and e-mail alert. The sighting will be verified by CRIMP before being added to the central database.

HOW DATA IS USED:

The data will be used to detect and document the spread of introduced pests. This data can be used in implementing management practices.

BEACH BAGGING: GET THE DRIFT AND BAG IT. BEACH CLEAN-UP SURVEY

ORGANISATION:

Marine Studies Centre and the Great Barrier Reef Aquarium

PROGRAM OBJECTIVES:

To survey and clean-up beaches.

PROGRAM COORDINATION:

The overall coordination of the program was carried out by the Marine Studies Centre and the Great Barrier Reef Aquarium with teachers coordinating their own work.

PROGRAM LOCATION:

Easily accessible sandy beaches in Queensland and Victoria.

TYPE OF COMMUNITY INVOLVED:

Primary school children.

MONITORING METHODS:

The site is first described and then the litter is collected and sorted into categories (composition and source). The number of items and weight of each category are recorded.

DATA SHEETS:

Basic data sheet.

DATA SUBMISSION:

Completed data sheets are mailed to the Marine Studies Centre or Great Barrier Reef Aquarium.

TRAINING/SUPPORT:

A information brochure is provided to the teachers.

DATABASE:

Not Known

HOW DATA IS USED:

Not Known.

"COD HOLE" SURVEY

ORGANISATION:

Lizard Island Research Station and Lizard Island Charters

PROGRAM OBJECTIVES:

To monitor the number of visitor/diver and potato cod at a popular dive site named the 'Cod Hole' on the Great Barrier Reef.

PROGRAM COORDINATION:

The commercial charter operator from the boat "Volcare" in association with the Great Barrier Reef Marine Park Authority (GRMPA). The Lizard Island Research Station was also involved in the collation, analysis and writing up of data for the program.

PROGRAM LOCATION:

A popular dive site named the 'Cod Hole', which is located on the Great Barrier Reef, to the east of Cairns.

TYPE OF COMMUNITY INVOLVED:

The charter boat operator and crew from the boat "Volare".

MONITORING METHODS:

The following are recorded each time the dive site was visited: number of boats/visitors/divers, types of activities, number of potato cods, other specific fish, and variety of other observations.

DATA SHEETS:

Basic data sheet.

DATA SUBMISSION:

Completed data sheets were sent to the Lizard Island Research Station.

TRAINING/SUPPORT:

No training/support required.

DATABASE:

Not known.

HOW DATA IS USED:

The Lizard Island Research Station produced a report on the data collected by the charter boat. This report will assist in developing management practices that will ensure the sustainable use of the "Cod Hole".

COTSWATCH

ORGANISATION:

Crown of Thorns Starfish Watch (COTSWATCH) has been running since 1993 under the management of the Great Barrier Reef Marine Park Authority (GBRMPA).

PROGRAM OBJECTIVES:

To collect basic information on the status of Crown of Thorns Starfish (COTS) populations and the health of corals.

PROGRAM COORDINATION:

Within GBRMPA there is a department that is dedicated to COTS research. Within this department there is a COTS Watch facilitator that runs the program.

PROGRAM LOCATION:

Primarily based in Queensland but the program is being spread throughout the northern regions of Australia.

TYPE OF COMMUNITY INVOLVED:

General public and tourist operators that are involved in SCUBA diving and/or snorkelling.

MONITORING METHODS:

Participants' record the site they visit providing details on the proportion of corals that appear to be dead/alive. Participants then simply count the numbers of COTS, and estimate size. This information can be written onto their slates and then latter transcribed onto the survey forms. The survey also collects information on various other areas such giant triton shells (predator of COTS) and diseased starfish.

DATA SHEETS:

Mail in survey forms that are distributed throughout the community with a brochure describing the program and providing background information on COTS.

DATA SUBMISSION:

Completed survey forms are mailed to the GBRMPA.

TRAINING/SUPPORT:

There are no training programs, as the species is so well known to the community. A series of brochure including the survey forms are distributed through the community. This raises awareness of the program and the issues surrounding COTS. It also promotes the participation of divers and snorkelers.

DATABASE:

The Great Barrier Reef Marine Park Authority (GRMPA) does have a database set up. No details on the database.

HOW DATA IS USED:

Information collected is used mainly by scientists. However some of this information finds it way back through the educational programs that GBRMPA runs. The data is summarised and displayed on an internet site.

DARNLEY COMMUNITY SURVEY

ORGANISATION:

"Island Coordinating Council" a part of the Marine Study for Torres Environment Resources Strategy (MaSTERS).

PROGRAM OBJECTIVES:

In order to develop a community environmental resource management plan (ERMP) the following aims were answered by conducting a household survey:

- identify environmental issues that the community felt were important;
- obtain perspective's on the community use of marine resources in their adjacent reefs (home reefs);
- obtain information on resource use and areas of resource collection; and
- update socioeconomic information about the community.

PROGRAM ORGANISATION:

Members of the MaSTERS program and local residents.

PROGRAM LOCATION:

Darnley island and the northern regions of Queensland including the waters of Torres Strait.

TYPE OF COMMUNITY INVOLVED:

Indigenous communities that rely on turtles and dugongs for cultural reasons. eg the Kuku Yalanji community

MONITORING METHODS:

The program ensures that catch information is recorded by hunters and entered into the community-based logging system. It also aims to establish a community-based system of collection for turtle tags and facilitate tag information feedback to hunters.

DATA SHEETS:

Not Known.

DATA SUBMISSION:

Not Known.

TRAINING/SUPPORT:

Not Known.

DATABASE:

Not Known.

HOW DATA IS USED:

The program pays close attention to the individual community needs, providing communities with access to scientific information on Turtles and Dugongs.

Conclusions

There are number of related programs involving different communities. In general these programs are still in the development stages. No protocols have formally be yet been decided on to date. This project provides a good example of a program with simple aims, which involves a high degree community participation and education. The methods used to encourage and secure long-term community participation may provide a good example for us. The community has had ownership of the project from the start and involvement at all stages.

DRAGON SEARCH

ORGANISATION:

Australian Marine Conservation Society (AMCS) and a number of other organisations.

PROGRAM OBJECTIVES:

To collect the records of Seadragon sightings. The information submitted is entered into a database that will provide a better understanding of the distribution, status and life history of these fish. The collection of dead seadragons provides information on seadragons including the animal's sex.

PROGRAM COORDINATION:

The project is coordinated by project officers at AMCS on a state basis.

PROGRAM LOCATION:

The program is being carried out throughout the range of the seadragons, which includes Western Australia, South Australia, Victoria, and New South Wales.

TYPE OF COMMUNITY INVOLVED:

Participation in the project is open to all community members. Participants include those involved in recreational activities including scuba diving, snorkelling, fishing, beach combing, etc.

MONITORING METHODS:

The project relies on recording incidental sightings of seadragons while the community is engaged in their recreational activities. A glossy brochure and a sighting form are distributed through the community and encourage the community to record sightings and submit the forms giving details on the location and seadragons.

DATA SHEETS:

The data sheets are a mail in form that records all the details of the sighting. Data sheets are distributed throughout the community with a glossy brochure describing the project and giving background information on seadragons.

DATA SUBMISSION:

The sighting forms are mailed into the coordinators of the program, along with dead specimens, or photocopies of the dead specimen. The coordinators pass on the specimens to the relevant groups and enter the data into a database.

TRAINING/SUPPORT:

A glossy brochure that is being distributed to the community provides details on the project. It also provides background information on the two species includes photographs, which aid the community in the identification of the two species. There is also a web site on the project that also provides information.

DATABASE:

None in WA

HOW DATA IS USED:

It is not known if reports (feedback) are given to the community.

HINCHINBROOK REGION MARINE MAMMAL SURVEY

ORGANISATION:

James Cook University in association with the Hinchinbrook Region Marine Resources Advisory Committee and the Department of the Environment.

PROGRAM OBJECTIVES:

To assemble records of sighting of dolphins and dugongs in the Hinchinbrook region.

PROGRAM COORDINATION:

The program is being coordinated by a lecturer in the Dept. of Tropical Environment Studies and Geography.

PROGRAM LOCATION:

The program is carried out in the Hinchinbrook region.

TYPE OF COMMUNITY INVOLVED:

Any community member that sights a dolphin and or dugong.

MONITORING METHODS:

The observer marks the location of the sighting on a map that is attached to the data sheet. The following information is then recorded:

- species;
- confidence of identification;
- seen from (shore/sailing boat/etc..);
- number in the group;
- number of calves;
- photographs;
- weather;
- comments (activities etc.); and
- observer details.

DATA SHEETS:

The data sheets are a mail in form that records all the details of the sighting. Data sheets are distributed throughout the community.

DATA SUBMISSION:

The sighting forms are mailed into the coordinators of the program.

TRAINING/SUPPORT:

The information package/data sheet has a some information on dolphins and dugongs. The information sheets has some line drawing to aid in identification.

DATABASE:

Not known

HOW DATA IS USED:

The data collected will assist with the development of management plans that will help ensure the protection of these inshore marine mammals.

ISLANDER-BASED SEAFOOD CATCHES IN THE TORRES STRAIT PROTECTED ZONE

ORGANISATION:

CSIRO Division of fisheries initially developed the project and ran it for 2 years. The project was then transferred to the Australian Fisheries Management Authority (AFMA).

PROGRAM OBJECTIVES:

This program is focused on gathering information of island based subsistence and commercial fishing activities in the Torres Strait Protected Zone (TSPZ). In particular catch and fishing effort, identify seasonal and annual changes and the description of the characteristics of the fishery that is important to management. Fisheries include turtle and Dugong fishing.

PROGRAM COORDINATION:

The program is currently being coordinated by the Australian Fisheries Management Authority (AFMA). The program also work in conjunction with the roving observers that are predominant indigenous.

PROGRAM LOCATION:

The program is located in the Torres Strait Protection Zone (TSPZ). For monitoring purposes the area was divided into 4 groups of islands.

TYPE OF COMMUNITY INVOLVED:

The roving observers that carried out the monitoring were local indigenous members. They worked closely with the 14 island communities in the TSPZ, as the single observers were not capable of observing all fishing activities.

MONITORING METHODS:

The program relies on roving observers to collect basic information on a regular basis. As the study area was large monitoring was carried out by randomly sampling the 14 island communities. Observers recorded a number of factors. Each sampling day the observer recorded details of the catch landed and factors that affected the fishing effort. This information was collected by interviewing returning fishing parties. Each fishing excursion was recorded as a separate event.

- the catch from each fishing excursion was recorded to species level and weighed (or measured in the case of dugongs and turtles);
- the fishing gear type;
- the number of all the fishers;
- the name of the leader;
- the destination of the catch; and
- time taken.

Also the number of boats at each community, their length, status (active, storage) and the outboard type to collect basic information on a regular basis. ensures that catch information is recorded by hunters and entered into the community-based logging system. It also aims to establish a community-based system of collection for turtle tags and facilitate tag information feedback to hunters.

DATA SHEETS:

Survey form.

DATA SUBMISSION:

The data was submitted by the roving observers to AFMA

TRAINING/SUPPORT:

The indigenous roving observers were provided with training

DATABASE:

Not known

HOW DATA IS USED:

The conclusions of the study were summarised in scientific papers. The information is used by managers and by the local communities.

COASTAL RESOURCES MANAGEMENT PROJECT (CRMP).

ORGANISATION:

The Coastal Resources Management Project (CRMP) is one of several components of the Natural Resources Management II Program, a cooperative initiative of the Government of Indonesia and the US Agency for International Development, implemented by the Coastal Resources Centre of the University of Rhode Island and several Indonesian partner agencies.

PROGRAM OBJECTIVES:

CRMP has a number of major objectives that include the decentralisation and strengthen coastal resources management in Indonesia. This is to be achieved by developing successful models of decentralised, participatory and community-based coastal resources management initiatives in several provincial locations. Documentation and dissemination of lessons learned in the field sites will be used as a basis for considering provincial and national policies, which can foster more effective coastal management nationwide.

At a local level the objectives are to establish methods, procedures, strategies, actions and plans which can lead to improved or stable quality of life for the coastal communities, and stable or improved conditions of the coastal resources from which much of their livelihood depends.

PROGRAM COORDINATION:

Initially the program is being coordinated by a working group from CRMP. The group is divided into two sub-working groups, 1) socio-economic and 2) environmental. It is proposed that extension officers will be posted at all sites.

PROGRAM LOCATION:

The program is initially focusing on two villages, Bentenan and Tumbak in North Sulawesi, Indonesia. It proposed that the project will be expanded to other coastal regions in Indonesia, using the first two villages as a model.

TYPE OF COMMUNITY INVOLVED:

The program initially involved the working group, which liaised with the communities in the two villages. It is proposed that community groups will become involved as the project develops.

MONITORING METHODS:

Monitoring will be used to evaluate the management of coastal resources. There are two types of monitoring those involving socio-economic questionnaires and environmental monitoring. The methods were trialed initially by the working group. Coral reef surveys were conducted using several techniques (recommended by UNEP 1993):

- manta tow surveys to describe general reef condition and help select sites for 12 permanent transect sites;
- the line intercept method was used assess the sessile benthic coral reef community. The community was characterised using life form categories;
- coral reef fish populations were assessed by visual census along a 100 meter transect and included fish abundance, diversity and butterfly fish species counts;
- mangrove and seagrass areas were also mapped; and
- beach trash surveys were conducted with two transect sites at each village comprising of 100 meter transects.

DATA SHEETS:

Not known

DATA SUBMISSION:

Initial data was collected by the working group. It is proposed that data will be submitted through the local extension officer.

TRAINING/SUPPORT:

The initial stage of the program did not require training/support. It is unsure what level of training and support will be provided at latter stages. Some sort of training and support will need to be provided and will probably be the responsibility of the local extension officers.

DATABASE:

Not Known.

HOW DATA IS USED:

The data and results from the initial study will be used to guide further work. Data collected will be used to determine the effectiveness of existing management practices and used in the development of new management practices at all scales: local upwards.

KUKU YALANJI TURTLE AND DUGONG MANAGEMENT AND EDUCATION PROJECT - QUEENSLAND

ORGANISATION:

The project is being run by a number of groups that include the Department of Primary Industry (QLD) and the Great Barrier Reef Marine Park Authority (GBRMPA). It is confusing to which groups are involved in the program and whether particular programs are running.

PROGRAM OBJECTIVES:

This program is focused on involving indigenous communities in the biologically and culturally appropriate management of Turtles and Dugongs in the Great Barrier Reef Marine Park (GBRMP).

PROGRAM COORDINATION:

This program is run by coordinators that work through rangers and traditional elders that ensure that appropriate and useful information is made available to everyone.

PROGRAM LOCATION:

Northern region of Queensland and the waters of Torres Strait.

TYPE OF COMMUNITY INVOLVED:

Indigenous communities dependent on turtles and dugongs for cultural reasons. eg. Kuku Yalanji community

MONITORING METHODS:

Catch information is recorded by hunters and entered into the community-based logging system. In the future a community-based system for the collection and submission of turtle tags.

DATA SHEETS:

Not known

DATA SUBMISSION:

Not known

TRAINING/SUPPORT:

Not known

DATABASE:

Not known

HOW DATA IS USED:

The data that is collected is feedback to community The program pays close attention to the individual community needs, providing communities with access to scientific information on Turtles and Dugongs.

THE VICTORIAN SEAGRASS WORKSHOP

ORGANISATION:

The workshop was facilitated by the Marine and Coastal Community Network (MCCN). The workshop was the initiative of the Coastal Monitoring Program within the Marine Portfolio Group of Environment Australia.

PROGRAM OBJECTIVE:

The Coastal Monitoring Program aims to establish a network of ecosystem and issue-based monitoring groups. The network aims to increase the capacity to monitor changes in key coastal ecosystems throughout Australia and to direct the results into a response by management agencies. The objectives of the workshop were to contribute to the investigation of, the feasibility and advantages of, and requirements for:

- establishing an Australia-wide network of seagrass monitoring; and
- establishing a scientific and technical support framework for appropriate community activities.

PROGRAM COORDINATION:

The workshop was facilitated by MCCN. The workshop proposed an 'organiser' paid by the government to be the interface between science/government and the community. The 'organiser' has a project officer that manages the seagrass project/strategy. A Steering committee would also be established to set directions and priorities with scientists, government and community represented

PROGRAM LOCATION:

Victoria (workshop).

TYPE OF COMMUNITY INVOLVED:

The workshop was aimed at any groups interested in seagrasses. These included scientific organisations, nature conservation groups, recreational fishing clubs, commercial fishing organisations, aquaculture ventures, dredging companies, diving groups, local government authorities, committees of management, catchment authorities, coastal advisory bodies and state government agencies.

MONITORING METHODS:

The workshop discussed and trialed four monitoring techniques in order to determine their suitability for use by community groups. In general it was determined that groups would have to work in conjunction with a least one marine scientist.

- transects: to determine the density and distribution of seagrasses. Transects carried out using SCUBA, snorkelling, or glass bottomed boat. Transects should be carried out at least twice a year. The replication of transects is determined for each locality by scientists after they map the seagrasses, and decide on the stratification of seagrasses, then using power analysis to get the best results from the least effort, then decide on the statistical design, including the number of transects. Participants working with scientists would look at the percentage cover of seagrass, the species and their prevalence. In addition photographs could be taken at specified photo points;
- secchi disk, to determine level of light penetration and presence of seagrasses. Secchi disk measurements are done from boats and can be done at the same time as the transects;
- destructive counts and measurement of biomass including seagrass and epiphytes. Quadrats are set up from which all the seagrass is harvested (cut). The harvested seagrass is dried and then the dry weight measured. This can also be carried out for epiphytes; and
- productivity measurement – non-destructive counts. Quadrats are set up. Random seagrass plants within the quadrats are selected for monitoring. The participants punch holes in line with the top of the seagrass sheath. A week later, the participant removes individual shoots, cutting in line with sheath and also cutting in line with the holes. The two parts of the shoot (sheath to holes vs hole to shoot tip) to obtain

productivity measurement. It is a very good technique for quickly assessing the health of seagrass. The method is carried out twice a year with two visits each time one week apart.

DATA SHEETS:

Not applicable.

DATA SUBMISSION:

Data would be submitted to the project officer or entered directly onto an internet based database.

TRAINING/SUPPORT:

Training would be required and would cover the following:

- species identification
- methods of decreasing subjectivity of observations, of data recording and management and the scientific framework of the whole program.
- practical help in, for example, use of GPS, boat handling skills
- safety issues
- ongoing information about the place of this particular monitoring work within the whole program
- ongoing information about the obligations of government and the group
- training of volunteers to minimise impacts.

DATABASE:

Not yet developed but when developed it will be accessible on the internet

HOW DATA IS USED:

Data accessible through the internet and/or free or low cost to the community.

REEF WATCH SOUTH AUSTRALIA

ORGANISATION:

Reef Watch South Australia

PROGRAM OBJECTIVE:

Reef Watch is a long-term project that will monitor the health of temperate reefs through ongoing fish and reef habitat surveys. The objectives include:

- encourage the support and participation of recreational scuba divers and others in the community to monitor the health of the marine coastal environment;
- compile the information collected by divers in a database that is accessible to all members of the community, marine research organisations, industry and government;
- use this improved knowledge to increase community education and promote awareness of important issues for South Australia's reefs; and
- increase community involvement and influence in the management of our coasts and oceans. Communities deserve to have a say in how our coasts and oceans are managed and Reef Watch is a way of uniting the voices of the diving community with other concerned for the marine environment.

PROGRAM COORDINATION:

Project coordinator.

PROGRAM LOCATION:

Currently the metropolitan reefs near Adelaide but the program could expand to include other reefs in South Australia and eventually NSW, Vic and WA.

TYPE OF COMMUNITY INVOLVED:

Participants with SCUBA qualifications.

MONITORING METHODS:

The methods used by Reef Watch require a monitoring kit that can be purchased from Reef watch. The kit was developed with the consultation of the community and scientific advisers. The program focuses on monitoring reef fish and reef habitat. Fish survey are conducted by swimming along a 50 m transect and recording the types and number of fish observed. The reef habitat surveys use quadrats to estimate the percentage cover of sessile fauna, flora and substrate. These methods have not be trialed and therefore assessment of the accuracy of the data collected has not be determined.

DATA SHEETS:

Data sheets are fairly simple and list all the common fish and broad taxonomic categories of benthic fauna and flora.

DATA SUBMISSION:

Completed data sheets are sent to the program coordinator who checks and enter the data into the database.

TRAINING/SUPPORT:

Reef Watch does hold some training sessions with dive clubs. Reef Watch has produced a manual, that provides information on the project, and some information on the techniques used. To go with the data sheets there is a set of sheets that provide pictures. The program has also developed an internet site, which will provide additional support to participants.

DATABASE:

A database still in development is accessible on the *Reef Watch* internet site. The community can query the database if they are familiar with SQL programming.

HOW THE DATA IS USED:

The data that is collected is made available to the community, government departments and researchers via newsletters and the internet site. The data could be used to assist in the identification of areas for Marine National Parks and Protected Areas.

SEAGRASS WATCH - QUEENSLAND

ORGANISATION:

Seagrass Ecology Group of the Queensland Department of Primary Industries (DPI) and Northern Fisheries Centre. The program also includes a number of other projects that have become involved.

PROGRAM OBJECTIVES:

Monitor the condition and trends of seagrass meadows in Queenslands.

PROGRAM COORDINATION:

Program coordinator from the Seagrass Ecology Group (Queensland Department of Primary Industries, Northern Fisheries Centre, and Cairns). In the future community groups will play an active role the coordination of their specific programs.

PROGRAM LOCATION:

Initially Harvey Bay and the Whitsunday region but the program will be extended to the whole of Queensland, including Mossman Gorge community, already involved in dugong and turtle management programs.

TYPE OF COMMUNITY INVOLVED:

All interested community groups. The program is extending to involve indigenous communities that are involved in dugong and turtle management programs. The initial training workshop involved 40 participants that included schoolteachers who wanted to learn more information, Tafe students and parents with their kids

MONITORING METHODS:

The methods used are tailored towards the needs of each particular community that becomes involved. In general the methods used in the program do require the participant to have some experience in monitoring/seagrass. This can be achieved through the training course. The techniques that will be commonly used involve:

- identification of local seagrass species;
- visual estimation of above-ground seagrass, using a ranking system; and
- herbarium pressing to preserve seagrass samples.

The training program teaches participants how to use quadrats to estimate seagrass type and cover along a transect. In addition photographs are taken, and other observations are made (eg. anchor damage, dugong feeding scars etc..) In addition seagrass samples are taken to check the identification at latter date.

Methods will collect data on the condition and trend of seagrass meadow characteristics including:

- area;
- position and depth of habitat;
- seagrass species and cover (estimations using quadrats along a transect samples taken to confirm identification);
- estimates of biomass (visual estimation of above-ground seagrass, using a ranking system);
- presence of dugong feeding trails;
- notes on other fauna; and
- human impacts (eg anchor damage).

DATA SHEETS:

The data sheets are basic having space for recording the percentage cover of seagrass based on categories (nil, 1<10%, 10-50%, 50-100%). There is also space for recording the percentage species composition, with the most common species listed. There is also space for describing substrate type and other comments.

DATA SUBMISSION:

Completed data sheets and sample specimens are returned to the program coordinator. The project coordinator checks the accuracy of the data.

TRAINING/SUPPORT:

The monitoring techniques used require scientific skills and knowledge. Initial training sessions were carried out in March 1988. This initial training was used to refine techniques and train an initial core group of participants. The training exercise went over three days. The training session covered:

- identification of local seagrass species;
- visual estimation of above-ground seagrass, using a ranking system;
- herbarium pressing to preserve seagrass samples; and
- knowledge of how data collected from a survey is put into a GIS, interpreted and used for management.

The program produced a manual/guidelines for community groups and volunteers in the Whitsunday Region. The manual provides information on the issues/concerns of seagrass communities and the training programs that are based on the monitoring methods. The manual also provides a guide to the identification of seagrasses, methods of seagrass mapping and relevant scientific articles.

The training program is run over two days and is divided into a one day field session and a one day laboratory session. During the field session the techniques used in monitoring are explained. There is then a hands on section where participants practice the techniques. The laboratory session participants learn about seagrass taxonomy, preparation of specimens, and how the data collected in entered into a GIS, interpreted, and use for management.

DATABASE:

Currently no database but in the future data will be entered into a GIS database (as part of the coastal atlas).

HOW THE DATA IS USED:

Community groups currently receive feedback on collected data via mail outs. In the future community groups, management agencies and scientists will be able to access seagrass maps created from collected the data by accessing the GIS database located on the internet.

APPENDIX 3: OVERSEAS BASED COMMUNITY MONITORING PROGRAMS

AQUANAUT: REEFBASE

ORGANISATION:

Global Coral Reef Monitoring Network based in the Philippines commonly referred to as *ReefBase*.

PROGRAM OBJECTIVES:

The *ReefBase* "Aquanaut system" was developed to provide reef conservation enthusiasts with a simple statistically sound monitoring techniques. The method enables divers without special training in reef species identification to monitor reefs. It allows rapid and efficient monitoring of reefs over a wide geographical area.

PROGRAM COORDINATION:

Global Coral Reef Monitoring Network uses trained marine scientists. The program is coordinated from the headquarters in Southeast Asia. The program uses trained marine scientists to lead groups of volunteers.

PROGRAM LOCATION:

Worldwide with a focus on south east Asia

TYPE OF COMMUNITY INVOLVED:

Anyone with SCUBA qualifications that has made at least 10 open water dives. The program specifically targets the estimated seven million recreational divers worldwide as well as dive boat operators, park rangers, and individuals from local communities.

MONITORING METHODS:

The monitoring methods used have been collectively name the "Aquanaut Method". The development of the methodology for this system was based on the ASEAN-Australian coral reef monitoring protocol (English et al. 1994) and on meetings with volunteer coral reef monitoring groups during conferences in 1995 and 1996. *Reefbase* carried out the final test and fine-tuning of the techniques. The techniques used are reflective of the level of skills (Scuba and scientific) that an experienced recreational diver has.

The Aquanaut survey asks to divers to look for different organisms, including coral, molluscs, sea urchins, sea stars, sea cucumbers as well as the plants that are encountered on reefs. The diver notes their location along the study area, their abundance and any other notable features such as coral damage. This information is recorded on Aquanaut Forms A and B. The diver is not required to identify fauna and flora to a species level, but instead identify based on broad categories that include:

- hard corals;
- sea fans;
- sea stars;
- sea cucumbers;
- seagrasses;
- soft corals;
- molluscs;
- sea urchins; and
- seaweeds.

The Aquanaut system includes only benthic habitat and invertebrates and not fish.

The methods are based on short length transect lines.

- 5 m long line calibrated with weights at every 0.5m;
- dive slates; and
- Aquanaut forms on water proof paper.

DATA SHEETS:

There are four different data sheets:

1. *ReefBase Aquanaut Reef Form* which is a cover form with the reef's name and summary information about the reef
2. *ReefBase Aquanaut Site Form* which is filled out for each site to be covered within the reef. information is required about the location, depth and type of site
3. *ReefBase Aquanaut Form A* needs to be filled out for each transect within each site. Form A provides an overview of the status and health of the reef.
4. *ReefBase Aquanaut Form B* needs to be filled out for each transect within each site. Form B focuses on the types of corals on the reef, estimates the average coral size and records the extent and likely causes of damage to the corals.

DATA SUBMISSION:

The set of completed data sheets are mailed to *ReefBase* along with any photographs.

TRAINING/SUPPORT:

Reefbase has a comprehensive manual and also offers three day training courses (*Aquanaut Course*) that introduces the diver to the methods used, especially in regards to the placement of transects, and carrying out transects. There are a number of other courses including the Aquanaut Calibration Course and the Aquanaut Instructor Course. Aquanaut has certification standards that are based on the participant's qualifications (Aquanaut courses completed, number of surveys completed and SCUBA qualification).

DATABASE:

Reefbase is a database on coral reefs and their resources. The database is sold on a CD-ROM and caters for an audience with a strong interest in coral reefs (ie. scientifically). The database incorporates data collected using the *Aquanaut* methods and *Reef Check*. Also included is data on ecology, harvest, stresses, sociology, economics, management, oceanography and mariculture aspects.

HOW THE DATA IS USED:

The *Reefbase* CD-ROM is released annually. The database is used by community groups, managers and scientists The data may alert experts about events in areas that may need further study. Coastal managers, conservationists and other local groups may use reef data to design programs and strategies for reef conservation and management. Reef data will also be useful for the government, in designing and implementing laws and policies aimed at conserving reefs.

BUTTERFLYFISH AS AN INDICATORS OF CHANGE ON INDO-PACIFIC REEFS

ORGANISATION:

Not linked to a specific organisation.

PROGRAM OBJECTIVES:

Monitor Butterflyfish communities an indicator of coral reef 'health'.

PROGRAM COORDINATION:

Not known

PROGRAM LOCATION:

Developed in the American Flag Islands, but makes reference to worldwide use.

TYPE OF COMMUNITY INVOLVED:

Members of the US Department of Defence and local indigenous communities (Participants have little background in marine sciences).

MONITORING METHODS:

The manual describes a three tiered monitoring program with an increasing degree of complexity and skills with each tier. The first tier involves the identification and counting of butterflyfishes (coralivores) along a 30m belt transect. Participant identification skills are matched to the method with participants unfamiliar with identification counting only one species, while more skilled participants count a number of species. The second tier involves monitoring benthic habitat (cover and diversity) along a 30 meter transect using the point intercept method (one meter intervals). The Identification skills of the participant determine whether they record coral morphology or coral family/genus. The third and most complex tier involves monitoring butterflyfish behaviour and territory size. Fish are observed for 50 minute taking note of their behaviour including interactions with other fish, feeding and types of coral they feed on.

DATA SHEETS:

There is no standard data sheet. Data is initially recorded on underwater slates and then entered into a pre-formatted spreadsheet, which calculates means, standard error, and the percentage cover of the coral groups.

DATA SUBMISSION:

Not known.

TRAINING/SUPPORT:

Initially a great deal of work was done in developing the techniques. This is included an extensive training period which did not involve the indigenous communities. Initial training was carried out over three days incorporating both field and lab work. There was also an extensive field testing of the techniques developed, which included 640 hours of on-site in water collection. These initial development of techniques will then passed onto indigenous populations.

A manual and video were produced and aimed at individuals with limited technical science background and expertise. It is not clear but it seems that training sessions are also carried out. The first two steps of this monitoring are relatively easily carried out by a participant with minimal training. The third step yields data that is more complex and the analysis is very subjective and is best carried out by an experienced marine scientist.

DATABASE:

Not known.

HOW THE DATA IS USED:

The first two tiers of the monitoring program can provide data that can be easily extraoplotated to are easily translated into a format that be usesful to the community. However the third tier provides complex data and it's analysis is very subjective and can only be carried out by specialist marine scientists.

CORAL DIVER NETWORK

ORGANISATION:

Coral Reef Alliance (CORAL) a non-profit membership organisation.

PROGRAM OBJECTIVES:

- educate divers and the general public about the problems facing coral reefs worlwide;
- provision of funding and technical support for coral reef conservation around the world;
- document health of global coral reef ecosystems; and
- document impacts on coral reefs.

PROGRAM COORDINATION:

CORAL collates and summarises the data that is submitted.

PROGRAM LOCATION:

Coral reefs worldwide.

TYPE OF COMMUNITY INVOLVED:

Qualified SCUBA divers and snorkelers.

MONITORING METHODS:

The CORAL Reef Observation Report gets the diver to record information on the sites they visit. The information is purely qualitative. The only semi-quantitative information is a rough estimation of live coral. It also includes observed impacts on corals such as human activities.

DATA SHEETS:

CORAL Reef Observation Report Sheet is an electronic form located on the CORAL internet site. Divers complete the electronic form on-line.

DATA SUBMISSION:

Completed forms are submitted to Coral.

TRAINING/SUPPORT:

No training required to collect data.

DATABASE:

Not known

HOW THE DATA IS USED:

Submitted data is summarised and presented on the CORAL internet site.

CORAL CAY CONSERVATION

ORGANISATION:

Coral Cay Conservation (CCC) is an international organisation

PROGRAM OBJECTIVES:

Data collected is used to ground truth GIS survey data used in marine management and the construction of management plans.

PROGRAM COORDINATION:

All the programs are coordinated by CCC, which is a large organisation. At each site there are personal that run the programs.

PROGRAM LOCATION:

CCC has programs running in Belize, the Philippines and Indonesia. Programs focus on sites where there is little or no physical and biological information previously exists.

TYPE OF COMMUNITY INVOLVED:

Paying volunteers and local communities.

MONITORING METHODS:

CCC collects baseline information on the physical and biological characteristics of reefs. Also recorded are any obvious indicators of anthropogenic disturbance. CCC has also been involved in selecting and setting up suitable permanent monitoring sites in Belize and the Philippines.

DATA SHEETS:

Not Known

DATA SUBMISSION:

Not known

TRAINING/SUPPORT:

CCC provides a training program for participants, which usually runs for 7 days. Typically participants stay for periods of a least a month. After the training period, the participants are guided and supervised by team leaders that are experienced scientific personal.
In the Danjugan Island world the training program included:

- biogeography of the Philippines; reef zonation; reef ecology; habitat classification;
- basic biology and identification of the organisms encountered; biologically and ecologically important species and identification; endemism;
- local fishing methods; problems, threats and recognising impacts on coral reef;
- survey techniques; data recording and verification; compilation of species lists; and
- estimation of sea state (Beaufort scale), cloud cover (oktas), and turbidity (secchi discs); water temperature measurements (thermometers); position fixing (GPS).

DATABASE:

Not known

HOW THE DATA IS USED:

The data collected is used to write reports that are made available. Specifically for government organisations or the body that funded the program

EPA VOLUNTEER ESTUARY MONITORING.

ORGANISATION:

United States of America Environmental Protection Agency (EPA) including the Office of Water; Office of Wetlands, Oceans, and Watersheds and Oceans and Coastal Protection Division).

PROGRAM OBJECTIVES:

- utilise the community to collect high quality reliable data to supplement government water quality monitoring programs;
- educate the public about water quality issues; and
- assemble a constituency of involved volunteers and enhance public support for water quality protection.

PROGRAM COORDINATION:

The programs are coordinated on three levels: Federal level Overall coordination is provided by the EPA. The program is coordinated on a number of different levels. Firstly there is the local level at which each program is coordinated. Then next level is a at a state level. Then there are coordinators with the EPA. Each program should have a program manager and a planning committee, which provide guidance.

PROGRAM LOCATION:

Throughout the USA.

TYPE OF COMMUNITY INVOLVED:

Entire community.

MONITORING METHODS:

There is a broad range of variables that are monitored, including:

- dissolved oxygen;
- nutrients and phytoplankton;
- submerged aquatic vegetation;
- bacteria; and
- marine debris

The EPA requires that community groups involved in monitoring prepare a Quality Assurance Project Plan (QAPjP). The plan specifies the planning, execution, and review of each aspect of data collection, emphasising the specific quality assurance and quality control techniques that will help ensure that the program can meet its quality objectives.

DATA SHEETS:

The EPA supplies the data sheets.

DATA SUBMISSION:

Completed data sheets are submitted to the program manager who then passes it on to their local contact within the EPA.

TRAINING/SUPPORT:

The EPA has produced a number of guides/manuals that are used for training and support. Training is primarily carried out by the community groups.

DATABASE:

Submitted data is entered into various EPA databases which are accessible through EPA internet sites.

HOW THE DATA IS USED:

Collected data supplements the data from other EPA monitoring programs. The manual outlines how the collected data should be presented within community groups

FRONTIER - TANZANIA MARINE PROJECT

ORGANISATION:

Frontier.

PROGRAM OBJECTIVES :

To survey the Tanzanian coastline, discover the most threatened areas and thus help the Tanzanian government to develop suitable management policies.

PROGRAM COORDINATION:

Frontier coordinates all programs along the Tanzanian coast. Individual programs are coordinated in the field by project staff.

PROGRAM LOCATION:

Msimbati in southern Tanzania, and southern Primerias & Segundos in Mozambique (Africa)

TYPE OF COMMUNITY INVOLVED:

Paying volunteers that have appropriate skills and backgrounds are lead by trained project staff.

MONITORING METHODS:

Not known.

DATA SHEETS:

Not known

DATA SUBMISSION:

Not known

TRAINING/SUPPORT:

Not known.

DATABASE:

Not Known

HOW THE DATA IS USED:

Program staff produce reports based on the data collected which are distributed to the funding bodies and local governments.

GLOBAL CORAL REEF MONITORING NETWORK (GCRMN)

ORGANISATION:

The International Coral Reef Initiative (ICRI) was launched at the United Nations Global Conference on Sustainable Development of Small Islands Developing States in 1994. This brought together IOC, UNEP, WMO and IUCN joined forces to co-sponsor the GCRMN co-sponsored by Australian Institute of Marine Station (AIMS) and International Centre for Living Aquatic Resources Management (ICLARM)

PROGRAM OBJECTIVES:

The GCRMN aims

- to improve management and sustainable conservation of coral reefs for people by assessing the status and trends in the reefs and how people use and value the resources. It will do this by providing many people with the capacity to assess their own resources, within a global network, and to spread the word on reef status and trends;
- to link existing organisations and people to monitor biophysical and social, cultural and economic aspects of coral reefs within interacting regional networks;
- to strengthen the existing capacity to examine reefs by providing a consistent monitoring program that will identify trends in coral reefs and discriminate between natural, anthropogenic, and climatic changes;
- to disseminate results at local, regional, and global scales by providing annual reports on coral reef status and trends to assist environmental management agencies implement sustainable use and conservation of reefs. Data will also aid preparation of predictive global climate change models for the GOOS Coastal Zone Module; and
- two special monitoring programs will be supported by the GCRMN: a pilot program undertaken simultaneously by research institutes around the world to give a snapshot of reef status; and the development of a tourist monitoring program coordinated through tourist operators.

PROGRAM COORDINATION:

Coordinated through 15 independent networks, or sub-nodes, in six regions around the world. Each sub-node is responsible for its own funding, and organisation of monitoring. They will submit their information back to the coordinators of GCRMN.

PROGRAM LOCATION:

The six regions include:

- Western Indian Ocean islands and East African States
- Middle East Gulfs
- South Asia (India, Sri Lanka and Maldives)
- East Asia seas (from Burma/Myanmar and Japan to Indonesia/Philippines)
- Pacific Islands states
- Caribbean and Intra-Americas, including countries with reefs bordering the Atlantic Ocean.

TYPE OF COMMUNITY INVOLVED:

The program will employ a team of monitoring trainers in each sub-node, which in turn will train similar trainers in participating countries. The training will continue through the region with the focus on monitoring by local groups. GCRMN where possible will make use of existing organisations and networks that carry out monitoring.

MONITORING METHODS:

Reefs will be monitored using line transects, assessing easily recognisable life-forms and total fish counts, with specific counts of 'target' fish of commercial or recreational value. As people gain more experience,

monitoring will be upgraded using the same methods, but to species level. Where there are existing monitoring programs the GCRMN will remain flexibility to incorporate different methods of monitoring.

DATA SHEETS:

Not known

DATA SUBMISSION:

Data is submitted to the coordinators of each sub-node, who in turn collate the data and maintain their own database.

TRAINING/SUPPORT:

There are three levels of training in this program. The first is the monitoring trainers in a sub-node. These people train people in different countries who in turn become trainers. They then train community groups. As participants become experienced in techniques, they can be upgraded to collect more detailed information.

DATABASE:

Each sub-node maintains its own standardised database.

HOW THE DATA IS USED:

Monitoring data collected by each sub-node is combined by the GCRMN coordinator, into annual global reef status summaries and disseminated to international forums, organisations and the media.

RAPID ASSESSMENT PROTOCOL (RAP)

ORGANISATION:

Atlantic and Gulf Reef Assessment (AGRA).

PROGRAM OBJECTIVES:

- the RAP program was developed to assess the condition of a large number of coral reefs primarily in the Atlantic and Gulf regions. It has not been developed as substitute for long-term monitoring. Instead it is aimed at developing answers to specific questions;
- what is the distribution and extent of reefs in serious decline;
- how does the condition of fringing reefs impacted by large populations compare with that of reefs remote from centres of populations; and
- where are those reefs whose condition and location makes them special candidates for marine protected areas or parks.

PROGRAM COORDINATION:

The program is being coordinated by the AGRA organising committee.

PROGRAM LOCATION:

Atlantic and Gulf regions.

TYPE OF COMMUNITY INVOLVED:

The program is aimed at marine scientists. A revision of the RAP techniques are being re-trialed by a group of 20 reef scientists.

MONITORING METHODS:

Representative reefs are selected using available information (benthic maps, aerial photographs, nautical charts, manta-tow surveys, and local knowledge). Sites are chosen in areas of maximum reef development. Sites in the 1-5 m and 8-15 m depth range are suggested.

Corals and Algae

At each site a 10 m transect line are laid randomly parallel to the long axis of the reef. This replicated 10 times at each site. Each time the transect is laid at least 1 m laterally away from the previous position. This will provide a total of 50 quadrats at each site. At each site it is best to record at least 100 coral colonies also. The diver approximates coral cover (nearest 10 cm) by estimating how many meters of transect overlie live coral.

Each coral that is >25 cm diameter and lies under the transect line are assessed:

- name (genus and species);
- maximum diameter and height (nearest 10 cm);
- percentage (%) partial mortality ("recently dead" and "long dead");
- diseases and/or bleached tissues present;
- sources of recent mortality that are still identifiable and contribute to "recent dead" estimate; and
- number of damselfish or total area of damselfish algal gardens on each head.

After completing the coral section, estimations of algal abundance using 25 X 25 cm quadrats. The quadrats are placed at the 1, 3, 5, 7, 9 m intervals of the transect line. The quadrat is placed avoiding large invertebrates. In each quadrat an estimation of the % abundance of macroalgae, turf algae, crustose coralline algae. The average canopy height of the macroalgae is also recorded.

After the completion of the quadrats the diver swims along the transect counting any *diadema* within a 1 m belt along the transect.

Fish

Fish are surveyed using a belt transect and rover diver methods. The belt transect is 30 meters long and two meters wide. All species are counted in the following families: grouper, snapper, grunt, parrotfish, surgeonfish, triggerfish, angelfish and butterflyfish (except for grunts or parrotfishes >5cm in length). Also countered are yellowtail damselfish, hogfish, Spanish hogfish, barracuda and bar jack. As well as counting the size of the fish are estimated and recorded as size categories (<5 cm, 5-10, 10-20, 20-30, 30-40, >40 cm). A minimum of 10 transects are carried out at each site, with each new transect located 5 m laterally from the previous transect. After the completion of the transects a census of all fish is done using the rover diver technique developed by REEF.

DATA SHEETS:

Not known

DATA SUBMISSION:

Not known

TRAINING/SUPPORT:

Not known.

DATABASE:

Not known

HOW THE DATA IS USED:

Not known

REEF CHECK

ORGANISATION:

Reef Check is an international reef-monitoring project that is established and run by marine scientists.

PROGRAM OBJECTIVES:

- raise public awareness about the value of coral reefs and the need for additional resources for conservation; and
- obtain a synoptic view of the level of human impacts on reefs worldwide.

PROGRAM COORDINATION:

Reef Check coordinates the global program through its internet site and e-mail. Teams from different regions are coordinated by team leaders.

PROGRAM LOCATION:

In 1997 there were approximately 200 sites worldwide, with two from Western Australia including Exmouth and Cocos Keeling.

TYPE OF COMMUNITY INVOLVED:

Individual teams are lead by a marine scientist. Reef Check involves volunteer divers that are lead by a team leader that is a marine scientist. A position on the team is at the discretion of the team leader.

MONITORING METHODS:

The methods that Reef Check use have been modified to simplify them and minimise the time needed to complete them. Monitoring is carried out once a year during a set time period (June to August). Techniques use indicator species that can be used to determine coral reef health and the impacts of human activities. Indicator species include fish and invertebrate species that are easily identified and seen. The abundance and distribution of the indicator species is determined using belt transects. The same belt transects are also used to survey the benthic habitat, with benthic habitat being broken into broad categories avoiding the need to identify coral species and morphology. The survey also includes general observations on visible signs of human activities/impacts and other effects such as disease.

DATA SHEETS:

There are data sheets available from the web page, which can be printed out and then filled in. There are three different data sheets that must be completed for each site monitored: 1) Site description data sheet 2) Belt transect data sheet, and 3) Line transect data sheet. Registered participants are e-mailed out a pre-formatted excel spread sheet on which to enter their data. The excel sheets has been set up to carry out all the necessary calculations.

DATA SUBMISSION:

Each monitoring team is responsible for ensuring that there are no errors in their data or data entry. Once the data is entered into the excel spread sheet it can then be e-mailed or up-loaded to Reef Check. A hard copy of the data is also forwarded to Reef Check.

TRAINING/SUPPORT:

Reef Check does not provide training for participants. Instead it relies on a suitably qualified marine scientist that is the team leader. It is the responsibility of the leader to ensure that team members have the skills necessary to carry out the monitoring techniques used. The team leader can use members that are also

marine scientists, or use participants that require some level of training that is provided by the leader, or other members of the team

DATABASE:

Not known

HOW THE DATA IS USED:

Reef Check at the conclusion of each year's surveys (October) presents summaries of the data collected to the media and to the world via their Internet site.

REEF ENVIRONMENTAL EDUCATION FOUNDATION (REEF)

ORGANISATION:

REEF was established in 1990 as a non-profit organisation of recreational divers who systematically conduct fish bio-diversity and abundance surveys during their dives.

PROGRAM OBJECTIVES:

REEF's objectives include:

- to provide training and education opportunities for SCUBA divers and snorkelers to learn to identify and appreciate marine life;
- to make data and summary reports readily accessible to the marine science, resource management, and conservation communities;
- to promote the diving community as a conservation-minded and active partner in the long-term protection of coral reefs and other marine systems; and
- to encourage support and implementation of effective marine conservation strategies developed through government, private or public frameworks.

PROGRAM COORDINATION:

The program is coordinated by program facilitators that are employed by REEF. Volunteers also assist in program coordination.

PROGRAM LOCATION:

Based in the US and the wider Caribbean

TYPE OF COMMUNITY INVOLVED:

Any community members can be involved in the program. Generally SCUBA divers and snorkelers are involved in the fish surveys.

MONITORING METHODS:

REEF has developed its own survey technique called the Roving diver technique. This technique has been developed with the recreational diver in mind. Unlike other scientific techniques it does not require divers to establish transects. Instead divers just identify and estimate the abundance of fish during their dives. The fish that are included in the survey is extensive but not too detailed. The methods inform divers that they should only record species that can be positively identified. The technique is based on the fact that diver fish identification skills will improve with experience. For example it is assumed that the fish that could not be positively identified will be latter identified by using fish identification guides, so in the future the diver can identify these species. Along with identification of fish they are asked to estimate the abundance of species using different ranges. Which include single =1, Few = 2-10, Many = 11-100, Abundant = over 100. Other information that is collected by the participants include:

- GPS or other identification of site;
- water temperature;
- bottom time;
- dive start;
- visibility;
- average depth;
- current; and
- habitat (broad categories).

DATA SHEETS:

Divers record this information on their underwater slates. When the dive is completed they transcribe their data onto a computer scansheet, which they return to REEF

DATA SUBMISSION:

REEF reviews the submitted scansheets before passing them onto the Marine Conservation Science Centre at the University of Miami, which then enters them into the database.

TRAINING AND SUPPORT:

Participants in REEF's fish survey program do not require formal training sessions in fish surveying techniques or in fish identification. The programs encourages participants with little experience to join the program. It is expected that participants in the program will development the fish survey techniques and fish identification skills. REEF aids in this process through the sale of a manual (Surveying Coral Reef Fishes). The Chairman of REEF has also for sale comprehensive identification books that are used by participants. The REEF website also provides a quiz on fish identification to help improve fish identification skills. REEF has also established field stations at locations in the US and Caribbean that provide support in the form of courses on survey techniques and fish identification.

DATABASE:

The database for the program is located at the Marine Conservation Science Centre, University of Miami. Completed data sheets are sent to the centre where they are scanned into a sophisticated database program that is designed specifically for marine management studies.

HOW THE DATA IS USED:

This database is used to produce reports on species distribution and population trends, for a specific reef or large geographic regions. These reports are published on the REEF website.

REEFWATCH II - THE INDIAN OCEAN CORAL REEF FISH MONITORING PROGRAM

ORGANISATION:

Reef Watch II is a community monitoring program run by the Tropical Marine Research Unit based at the York University in the UK

PROGRAM OBJECTIVES:

To monitor the distribution and abundance of key families of coral reef fish as a means of understanding and conserving biodiversity of coral reefs within the Indian Ocean region.

PROGRAM COORDINATION:

The program is coordinated by Tropical Marine Research Unit at the York University in the UK.

PROGRAM LOCATION:

The Indian Ocean region.

TYPE OF COMMUNITY INVOLVED:

The program targets a broad range of the community including local organisations involved in reef or coastal zone management (eg. environmental agencies, marine national parks or fisheries departments), and by SCUBA diving groups or centres based in or planning expeditions to countries within the region. Also individual divers, if they have well developed fish identification skills.

MONITORING METHODS:

Fish are censured by swimming along a depth contour for a distance of 200 meters counting all the individuals of the relevant family present within a distance of 5 meters to either side of the contour. Counts can be repeated for each of the four main families or groups of families being monitored by the project. These are 1) Butterfly and Angelfish, 2) Emperors and Snappers, 3) Groupers, 4) Triggerfish and pufferfish. Similarly counts can be repeated at two or more standard depths. Observers can specialise in identification and counting a single family (or group of families) of fish. Most volunteers begin by returning counts for only one group of fish, most frequently butterfly and angelfish, which are probably the easiest to identify and of greatest interest for reef monitoring and biodiversity studies.

DATA SHEETS:

There are two data sheets for each monitoring location: 1)Site Basic information sheet and 2) fish count data sheets. The first part of the site basic information sheet is completed out of the water and involves the description of the site location. The second part provides simple semi-quantitative assessment of the shape of the reef, of the density of corals and of the extent of any apparent environmental impacts. The data sheets are transparent sheets, which are placed over a coloured fish identification chart of the fish families being surveyed.

DATA SUBMISSION:

Copies of the data sheets are returned to the York University.

TRAINING/SUPPORT:

Volunteers and organisations receive a project instruction manual. The manual is kept short and clear to facilitate use by non-specialist divers. Emphasis is placed on testing to ensure that observers reach acceptable standard of fish identification and counting. Training proceeds through the recognition of fish to the family level, before species within selected families are learned. Checking involves testing against sets of slides or video sequences and comparison of performance on the reef against experienced observers simultaneously swimming the same lengths of reefs. If organisations want to become involved then a trainer is usually sent to train them, alternatively individuals can be trained by organisations already trained in the methods.

DATABASE:

The data sheets received are checked for errors before being entered in a database called FoxPro, which is linked to a mapping program, called Quickmap. This enables maps to be drawn and regularly updated showing the distribution and abundance of target species. Further analysis of data is carried out using statistical software.

HOW THE DATA IS USED:

The analysis that is carried out can indicate differences in fish abundance or species diversity between different areas, for example a marine park and an adjacent unprotected areas, or one part of a region with another. Data for commercial species can also be inserted into a fisheries model that is being developed to assess whether stocks are being over-fished. Participating groups are also encouraged to prepare brief reports presenting their own data.

SEASEARCH UK

ORGANISATION:

Seaseach is jointly run by the Marine conservation society (UK) and the Joint Nature Conservation Committee.

PROGRAM OBJECTIVES:

The project's aim is to gather baseline information and map out the various types of seabed found in the near-shore environment (up to 5 miles off the coast). Seasearch provides a means for recording seabed types and abundance and rarity of certain species. Human impacts including the position of the site in relation to domestic and industrial development and potential pollution sources are also recorded.

PROGRAM COORDINATION:

The program is run by the Seasearch coordinator and local coordinators.

PROGRAM LOCATION:

England

TYPE OF COMMUNITY INVOLVED:

Local dive groups.

MONITORING METHODS:

The information that is collected during surveys is detailed. Participants in the project must have keen observational skills, and be able to identify local species. Observational skills include the ability to estimate % cover of benthic habitat and classify observations into categories. The participant is also asked to identify all species observed and provide estimations of abundance. It does require SCUBA skills, and the ability to make observations and describe what is observed. The level of information recorded varies greatly with the experience of the diver, most dive teams include at least one experienced person.

DATA SHEETS:

This information is Information recorded on underwater slates, is transferred to recording forms. The forms can be downloaded from the programs internet site.

DATA SUBMISSION:

The data sheets are collected by the coordinator and entered into the database.

TRAINING/SUPPORT:

Seasearch states that there is no training required for participation, however they do offer training days, and participation in dives organised by MCS. They are also working on an identification guide that will aid participants.

DATABASE:

The database is housed at museum and is maintained by one of the museum's curators. The database being used is a copy of the Marine Nature Conservation Review (MNCR) team's database. The database has been designed on an Advanced Revelation framework. One of the objectives of the project has been to allow the MNCR team access to the data collected. There are plans to adopt a more widely accessible database format for other groups to use. Access has been considered for this purpose, with one local group already using Access. This would allow local groups could then use the information that is gathered, as well as copies of the database being downloaded to a central resource centre (Marine Conservation Society Headquarters).

HOW THE DATA IS USED:

Habitat and community descriptions have then been summarised in a Biotype Manual, which has then been used to identify a number of sites of special interest for biological and natural features. In some areas this has resulted in these sites being managed under voluntary conservation designations. In Sussex the data has been used by the local council to set up 12 voluntary 'Marine sites of nature conservation importance'. Gathering information has involved local dive clubs in the Sussex area in recording at over 500 sites, so has provided useful baseline data for the council. Data is used not for quantitative analysis, but in a database to provide basic habitat and species information on an area which can be condensed into a written description of the environment at each site.