Biol. Mar. Medit. (2000), 7 (2): 393-396

L.J. MCKENZIE, W.J. LEE LONG, R.G. COLES, C.A. RODER

Northern Fisheries Centre - Department Of Primary Industries, PO Box 5396, Queensland 4870, Australia.

SEAGRASS-WATCH: COMMUNITY BASED MONITORING OF SEAGRASS RESOURCES.

Abstract

Community groups and volunteers are assisting fisheries scientists to establish a reliable early warning system on the status of seagrass resources, and a broad measure of change. The program, called Seagrass-Watch, includes community volunteers and/or groups trained to map and monitor intertidal seagrass habitats in Queensland. Community volunteers collect quality information for coastal management on changes in seagrass meadow characteristics, such as the extent of coverage, position and depth of habitat, species composition, estimates of abundance, presence of dugong feeding trails and possible human impacts. Seagrass-Watch is currently underway with communities in southern-, central-, and northern-Queensland regions.

Key-words: *seagrass, community involvement, monitoring, mapping.*

Introduction

The Seagrass-Watch program was established in 1998 as an initiative of the Queensland Department of Primary Industries (QDPI) to harness local knowledge and allow local community groups to help in mapping and monitoring seagrass habitats vital for fisheries, turtles and dugongs. Local community volunteers were trained in workshops organised by QDPI, in the methods required for scientifically rigorous assessment of seagrass resources. These volunteers were able to collect data from their region to give environmental managers an indication of the extent of seagrass resources. They also conduct ongoing monitoring and identify any areas of loss which may need particular attention.

The program was designed to provide an early warning of change in the seagrasses of each region and was established at specific sites identified using the results of mapping surveys. The sampling design and the parameters to be measured depend on the specific question to be answered and were decided in collaboration with the community and research scientists. The purpose of monitoring is to provide an early warning of change to alert management agencies.

This monitoring program is designed to depend on considerable input and feedback from community volunteers. It is user-friendly with simple field sampling methods, uncomplicated data recording and handling, and has prompt follow-up from a coordinator. This ensures information is fully used in coastal zone management for continuous good health of fisheries and dugong populations.

Methods

Program Structure

The success of the Seagrass-Watch program involves collaboration between Government and the Community by using: community resources; local coordination; local support; available capital, and scientific expertise.

Regional Steering Committees were formed within each project region with various stakeholders of the community to ensure that project goals and milestones were being met and to highlight any difficulties. A government funded Seagrass-Watch Coordinator was employed to manage/validate the data, coordinate between communities and scientists, establish networks and to develop the program state/nation-wide. The main contact in each region is a Local Community Coordinator who is a link in the information and data chain between local communities and the Seagrass-Watch Coordinator. Community groups are encouraged to meet periodically (such as monthly) to update members on the project status and coordinate volunteers to monitor sites and conduct extension activities to raise public awareness (local festivals and displays).

Training

Training of volunteers is usually comprised of three components – formal lectures, field training exercise, and laboratory exercise. Training includes hands on experience with standard methodologies used for seagrass mapping and monitoring (Coles et al. 1995). Methods used in the program however were modified based on feedback from participants during the training exercises. Participants were trained to identify local seagrass species, undertake rapid visual assessment methods (% cover), preserve seagrass samples for a herbarium, use a GPS, photograph quadrats, identify presence of dugong feeding trails or other impacts, and the use, analysis and interpretation (including Geographic Information Systems) of the data collected. Follow up training ("refresher") is an important component of the program to ensure that data collection is rigorous. Training aids were developed in consultation with the community and included a manual, field data books, and photographic reference sheets.

Seagrass resource mapping

Seagrass-Watch activities initially map the distribution of seagrass meadows in a region. Community volunteers were limited to mapping the accessible intertidal seagrasses, although in some cases subtidal seagrass meadows were included. Mapping activities were coordinated through the Local Community Coordinator to ensure that as much of the region is covered as possible within the shortest period of time. Mapping strategies were also checked with the Seagrass-Watch Coordinator to ensure rigour. Once field mapping is completed, the data sheets were returned to the Seagrass-Watch Coordinator, via the Local Community Coordinator (who checks for any discrepancies). After the data from the mapping activities has been validated and analysed, GIS maps were prepared for the region and fed back to the community groups.

Seagrass resource monitoring

Using these maps of seagrass distribution, a community consultation meeting with the Seagrass-Watch volunteers is held to select the locations for long-term monitoring. The program initially targeted inshore, intertidal seagrasses. In some cases subtidal seagrass meadows have be included. Site selection is assisted by consultation with environment management agencies, local government, and seagrass researchers. The position of sites may also be dependent on volunteers, as often volunteers elect to adopt a site which is close to their place of residence. Seagrass-Watch ongoing monitoring was

coupled where possible with existing environmental monitoring programs (eg. seagrass depth range, water quality and beach profile) to increase the ability to identify impacts.

The monitoring strategy is a nested design and is conducted at three scales: transect (metres), sites (kilometres) and locations (10s kilometres) (see McDonald and Kendrick, 1997). Long term monitoring sites are established in areas of a. relatively high usage, b. where usage may be high in the near future and c. in comparable 'control' sites where current and predicted usage is low and likely to remain low. Generally, three sites are established within each location.

At each site, three parallel 50 m transects (each 25 m apart) were established, but only the middle transect is permanently marked. The location of sites is determined by GPS. The seagrass habitats along each transect are sampled by visual observation. At each transect, eleven quadrats are sampled (1 quadrat every 5 m), every three or six months, depending on the related impacts, site access and availability of volunteers. Quadrats were photographed at random to ensure standardisation/calibration of observers and to provide a permanent record.

Results:

Seagrass-Watch programs have been established in the Hervey Bay and Whitsundays regions of Queensland with involvement of a number of volunteer community groups and individuals. Volunteers cover a diverse range of community sectors and include school groups/teachers, recreational & commercial fishers, SCUBA divers, State Agency volunteers, local Wildlife Preservation Society members, local tourism industry employees, local city councils, retirees, community youth groups, and other various interested individual community members. Local Community Coordinators and key contact people have been identified for the volunteer groups in each region.

Mapping of seagrass communities in each region has been conducted. Community groups and volunteers working with seagrass researchers successfully mapped 22% of the sites in a detailed baseline survey of Hervey Bay and Great Sandy Straits region seagrass communities in December 1998.

Long-term monitoring sites have been established in each region. In the Hervey Bay region, a total of 21 sites, including areas of high impacts and 'control' sites were established across eight locations between August and October 1999. Preliminary results indicate that the minimum detectable difference (MDD) varied from 3% to 86% (at the 5% level of significance with 90% power) based on a survey every 3 months for a period of 2 years (as per Gibbs 1995). MDD of as little as 3% change in cover was identified for uniform *Halodule uninervis* cover. In variable seagrass cover, MDD was as high as 86%, requiring a much larger alteration in seagrass cover of a sparse and patchy *Zostera capricorni* meadow before the change could be identified. Monitoring of sites is ongoing.

Seagrass-Watch data and associated GIS outputs have been used by environment management agencies for: responses to dredging proposals; assisted with assessment of flooding impacts; contributed to the information for world heritage value assessments for World Heritage Area listings; contributed to regional and local Plans of Management; and aided with the management of Dugong Protection Areas.

Discussion:

Community-based monitoring programs are an important addition to coastal management. Government agencies with limited funding and resources are often constrained with the amount of coast they can regularly monitor. Local residents and users are often the first to notice changes in coastal marine environments. They can be the best early alert to possible impacts in remote coastal locations.

Community-based monitoring provides members of the community with the ability to contribute to the preservation of their local environment. The hands-on and participatory nature of Seagrass-Watch is a cost-effective method of collecting data and maintains local interest and ownership in coastal seagrasses. The most powerful aspect of Seagrass-Watch is its potential as an educational tool to raise community awareness. It has generated local support and closer networks between community groups and government for seagrass conservation and management.

Maintaining momentum and positive outcomes from the Seagrass-Watch program has required regular quality feedback to community groups. A quarterly Seagrass-Watch Newsletter, regular reports and presentations help achieve this. A Data Management System with efficient data entry, validation and synthesis is essential for prompt feedback.

A Seagrass-Watch calendar/diary has been established to capture regular anecdotal information of seagrass related events and of activities which affect seagrass in a relatively standardised manner. Information recorded on the calendar is not statistical in nature but is used to interpret the monitoring data. The calendar also entices participation in the Seagrass-Watch program from a wider sector of the community.

Current levels of interest in Seagrass-Watch are high, but maintaining community participation in, and effectiveness of, the program will require continued government support to coordinate community volunteers and stakeholders. Further expansion of the program is expected as Aboriginal and Islander communities, and volunteer groups in other areas become involved in the management of their local seagrass resources.

Acknowledgments

The Seagrass-Watch program is funded by the Natural Heritage Trust-Coasts and Clean Seas Program, CRC Reef Research for the Great Barrier Reef World Heritage Area, Queensland Parks and Wildlife Service (EPA) and the Queensland Department of Primary Industries.

References

COLES, R., LEE LONG, W. McKENZIE, L. (1995) - A standard for seagrass resource mapping and monitoring in Australia. Erin, national marine information system, data collection and management guidelines - marine biology and fisheries. *http://www.environment.gov-.au/marine/coastal_atlas/documentation/standards/general/coles.html*

McDONALD J., KENDRICK G. (1997) - Video photography as a tool for monitoring seagrass communities. Unpublished report to the Department of Conservation and Land Management (Marine Conservation Branch), UWA, Nedlands : 30 pp.

GIBBS, J. (1995) - MONITOR: Software for estimating the power of population monitoring programs to detect trends in plant and animal abundance. *http://www.mp1-pwrc.usgs.gov/powcase/powcase.html*