THE
SOUTHERN BELIZE REEF COMPLEX

Conservation Action Planning in Belize

The Southern Belize Reef Complex (SBRC) encompasses some of the most important components of the Mesoamerican Reef system. It stretches from the littoral forest and mangroves of the coastline, across the shallow coastal lagoon with its scattering of idyllic cayes and near-pristine reefs, to the Belize Barrier reef and the reef drop-off, where grouper and snapper gather in huge spawning aggregations.

Belize, with its low population and relatively sparse coastal development, is recognized for having some of the least impacted reef areas and the highest diversity of fish species in the region. From the immense, impressive whale sharks to the smallest coral polyp, the reef and associated seagrass and mangroves are a complex, integrated series of ecosystems that support viable populations of threatened species, sustain the coastal fishing communities and draw tourists to Belize.

The Mesoamerican Reef (MAR) is the largest coral reef system in the Western Hemisphere, stretching for more than 600 miles along the coast of Belize, Guatemala, Honduras and Mexico. One of the most diverse ecosystems on earth, the MAR is considered outstanding on a global scale, and a priority for conservation action.

As part of the Belize Barrier Reef World Heritage Site, this area has international recognition for its natural and cultural resources. Coastal communities associated with the SBRC are preserving a traditional way of life that is closely tied to these marine resources, with fishermen free-diving for lobster and conch from locally built sailboats, or catching snapper and grouper for the local fish markets. These communities are seeking to maintain their cultural values and their links with the marine environment as they move into other livelihoods such as tourism.

Challenges lie ahead for the reef and the people who depend upon it. Numbers of critically endangered species such as hawksbill turtles are declining, as are those of important commercial fish stocks – grouper, snapper, lobster and conch – as increasing human pressure is placed on the system. Coastal developments, overfishing, aquaculture and agriculture runoff, and oil exploration and transport are ever increasing threats to the integrity of the Southern Belize Reef Complex.

TASTE
Toledo Association for Sustainable Tourism and Empowerment

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The Nature Conservancy
Protecting nature. Preserving life.

A Plan for Conservation Action

Project Partners

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This Conservation Action Plan (CAP) has been developed through a series of participatory workshops, with input from over sixty participants from all key stakeholder sectors. Fishermen, tour guides, protected area managers, researchers and Government departments have all contributed towards the process, providing important information for integration into the Plan. Outputs from this process provide recommendations for improving management effectiveness of the SBRC, including the strengthening of collaborations between project partners.

The Core Planning Team, facilitated by The Nature Conservancy, was identified at the start of the process, and includes representatives from the Fisheries and Forest departments, as well as Friends of Nature (FoN) and the Toledo Association for Sustainable Tourism and Empowerment (TASTE).

FoN and TASTE are currently collaborating to form the Southern Environmental Association (SEA), which will be responsible for the management of the three co-managed parks - Gladden Spit and Silk Cayes Marine Reserve, Laughing Bird Caye National Park and Sapodilla Cayes Marine Reserve. SEA is working towards taking full management authority for the three parks, with better integration of system-level monitoring, enforcement and community involvement. Both FoN and TASTE view this as a positive step towards improving the effectiveness of marine protected areas management across the SBRC.

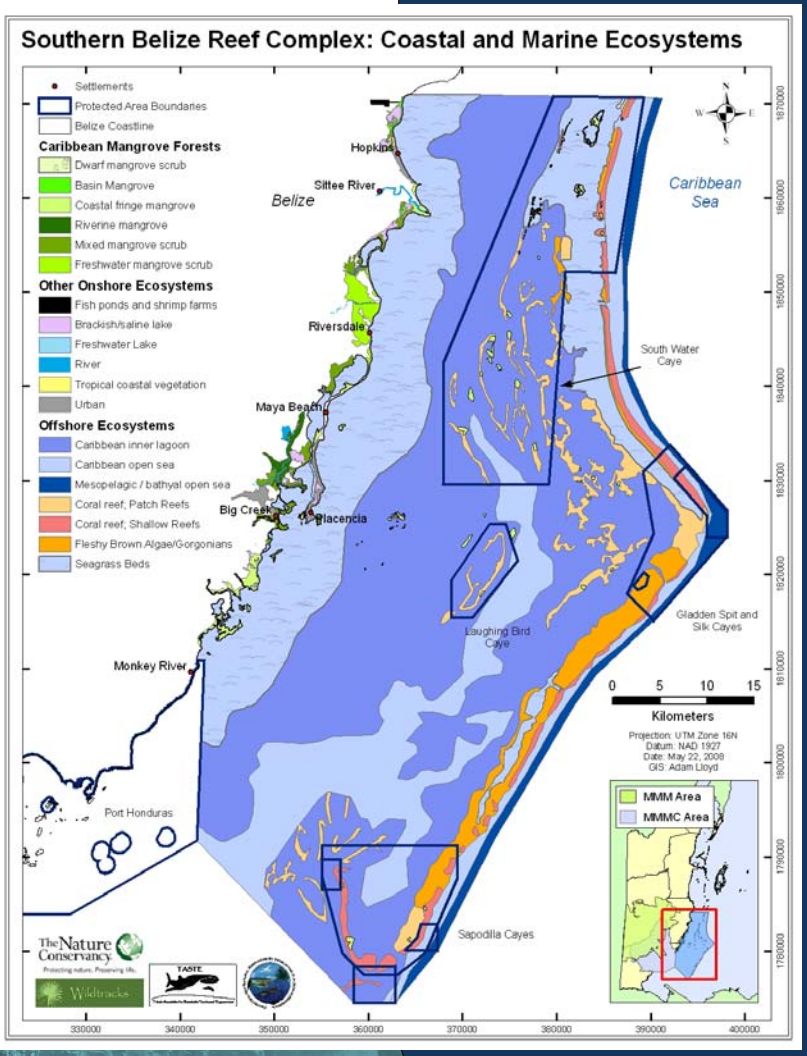
Right:
Cap 1 Workshop: Participation in the Conservation Action Planning process is key to the success of the SBRC initiative.

Project Area

The SBRC stretches southwards from the northern boundary of South Water Caye Marine Reserve to the northern boundary of Port Honduras Marine Reserve, and south-eastwards from the coastline of Belize to the Sapodilla Cayes and the outer reef. This area is characterized by the variety of reef structures, important cross-shelf habitat linkages and an assemblage of ecosystems considered possibly the most biodiverse in the region. The SBRC is of of great scientific value and importance for many species of conservation concern, including the critically endangered hawksbill turtle *(Eretmochelys imbricata)* and goliath grouper (*Epinephelus itajara*), and the endangered green and loggerhead turtles (*Chelonia mydas* and *Caretta caretta*) (IUCN, 2008).

The SBRC encompasses four marine protected areas - Laughing Bird Caye National Park, Sapodilla Cayes Marine Reserve, Gladden Spit and Silk Cayes Marine Reserve, and South Water Caye Marine Reserve. Three of these are part of a serial nomination of seven sites that are recognized as components of the Belize Barrier Reef System - World Heritage Site, representing classic examples of fringing, faroe and barrier reefs. Also covered within the scope are four legally protected critical spawning aggregation sites, including Gladden Spit, the largest aggregation known in the Mesomerican Reef ecoregion.

Within the SBRC estuarine and coastal areas are considered important for the West Indian manatee, whilst the sandy beaches have a history of use as nesting sites for all three marine turtle species. The nearshore mangrove nursery areas and seagrass are regionally important for recruitment for a significant number of the commercial marine species. These resources are an integral part in the support of the cultural traditions of the coastal fishing communities.



A Vision for the Southern Belize Reef Complex

BELIZE

A collaborative stewardship of the internationally recognized Southern Belize Reef Complex, through strategic partnerships to conserve and improve the integrity of these socio-economically and biologically important ecosystems for the benefit of future generations

A collective Vision for the Southern Belize Reef Complex, Belize CAP Workshop, May, 2008

Protected Areas of the Southern Belize Reef Complex

	Acres
Marine Reserve (IUCN Cat. IV)	
South Water Caye Marine Reserve	117,875
Sapodilla Cayes	38,594
Gladden Spit and Silk Cayes	25,978
National Parks (IUCN Cat. II)	
Laughingbird Caye National Park	10,120
Spawning Aggregation Sites (IUCN Cat. IV)	
Gladden Spit	3,997
Rise and Fall Bank	4,252
Nicholas Caye	1,663
Seal Caye	1,600
Total SBRC Area (approx. acres)	779,682

Species of International Concern	
Critically Endangered	
Goliath Grouper	*Epinephelus itajara*
Black Grouper	*Epinephelus nigritus*
Hawksbill Turtle	*Eretmochelys imbricata*
Endangered	
Loggerhead Turtle	*Caretta caretta*
Green Turtle	*Chelonia mydas*
Nassau Grouper	*Epinephelus striatus*
Red Porgy	*Pagrus pagrus*
Great Hammerhead	*Sphyrna mokarran*
Vulnerable	
Queen Triggerfish	*Balistes vetula*
West Indian Manatee	*Trichechus manatus*
Hogfish	*Lachnolaimus maximus*
Mutton Snapper	*Lutjanus analis*
Cubera Snapper	*Lutjanus cyanopterus*
Yellowmouth Grouper	*Mycteroperca interstitialis*
Whale Shark	*Rhincodon typus*
Whitelined Toadfish	*Sanopus greenfieldorum*
Rainbow Parrotfish	*Scarus guacamaia*
IUCN, Redlist, 2008	

What is at Risk?

Stretching along the coast of Belize, Guatemala, Honduras and Mexico for more than 600 miles, the Mesoamerican Reef is the largest coral reef system in the Western Hemisphere.[1] The SBRC is considered a priority within the Mesoamerican Reef ecoregion. It is important nationally and regionally in its role of maintaining viable populations of at least 17 species of international concern.[2] Three of these are considered Critically Endangered – Goliath and Black Groupers (*Epinephelus itajara* and *Epinephelus nigritus*), the Hawksbill Turtle (*Eretmochelys imbricata*). A further two, the Smalltooth and Largetooth Sawfish (*Pristis pectinata* and *P. perotteti*), are now thought to be ecologically extinct within the SBRC, and possibly within Belize.[3]

The Complex also protects four spawning aggregation sites, where the black grouper (*Mycteroperca bonaci*), the endangered Nassau grouper (*Epinephelus striatus*) and the vulnerable mutton and cubera snappers (*Lutjana analis* and *L. cyanoptera*) – gather in vast numbers to spawn around the full moon. The fisheries resources support the artisanal and commercial fishermen and coastal communities throughout Belize, from Sarteneja in the north, to the more southerly communities adjacent and within the SBRC – Dangriga, Riversdale, Hopkins, Sittee River, Seine Bight, Placencia, Independence, and Monkey River.

The environmental services of the SBRC are critical, not only for the marine biodiversity, but also for the coastal communities, and for Belize as a country. The mangroves and littoral forests provide protection for both life and property, preventing coastal erosion. They also provide an important nursery area for many commercially important marine species.

The reef also has immense economic value to Belize as a tourism resource, with its diverse, colorful fish, clear waters and the coral-sand cayes. Tourism is one of the primary foreign exchange earners for Belize, bringing with it employment opportunities and the possibility of income diversification in the coastal fishing communities.

[1] World Resource Institute, 2001
[2] Rated as Critically Endangered, Endangered or Vulnerable under IUCN, 2007
[3] Rachel Graham, Wildlife Conservation Society, pers. com. 2008

Conservation Targets

Selection of Conservation Targets

A series of conservation targets were selected to represent and encompass the biodiversity values of the area, and to provide a basis for setting goals, developing strategies and actions, and monitoring success.

Southern Belize Reef Complex:

Mangroves
Mangrove forest species, providing structure for nesting coastal/marine bird species, and juvenile lobster and commercial fish species. Protect the coastline from erosion

Coastal Lagoons and Estuaries
Seagrass, critical ecosystems for juvenile lobster and commercial fish species, sawfish, rays, West Indian (Antillean) manatee

Littoral Forest and Sandy Beaches
Tropical coastal vegetation, nesting beaches of hawksbill, green and loggerhead turtles, American crocodiles, migratory bird species. Critical for protection of shorelines

Seagrass
Seagrass species and associates - queen conch, marine turtles, juvenile lobster and fish species, algae. Stabilizes the sandy seafloor and provides critical nursery habitat

Spawning Aggregations
Congregations of spawning finfish – particularly grouper and snapper. Critical for maintenance of many commercial species

Commercial / Recreational Species
Queen conch, spiny lobster, crabs, shrimp, commercial finfish - grouper, snapper etc., sports fish (permit, snook, bonefish, tarpon), and baitfish

Wide Ranging Large Marine Vertebrates
Shark species, including whale sharks, hawksbill, green and loggerhead turtles, dolphins – require connectivity to seas and oceans beyond the SBRC

Coral Reef Communities
Coral species, reef fish, key herbivores (*Diadema*, parrotfish), reef invertebrates. Maintain the high productivity of the reef ecosystem.

Photo credits: R. Graham, D. Seiferth, Wildtracks

Conservation Targets

Assessment of Target Viability

The Viability Assessment provides an objective, consistent means for determining changes in the status of each conservation target over time, providing baseline for measuring success.

The viability of each conservation target was assessed based on its Landscape Context, Condition and Size, with the majority of the targets having a viability rating of **Fair**. Marine seagrass and was one exception, the health of this system being rated as **Very Good**, with few human impacts. Wide ranging large marine vertebrates has a rating of **Good**. Overall, however, the viability of the Southern Belize Reef System is considered **Fair.**

Conservation Targets	Landscape Context Rating	Condition Rating	Size Rating	Viability Rating
Littoral Forest / Sandy Beach	Good	Fair	Fair	Fair
Mangroves	Fair	Fair	Good	Fair
Coastal Lagoons and Estuaries	Good	Fair	Poor	Fair
Seagrass	Good	Very Good	Very Good	Very Good
Coral Reef Communities	Good	Poor	Fair	Fair
Commercial / Recreational Species	Fair	Fair	Fair	Fair
Spawning Aggregations	Fair	Fair	Fair	Fair
Wide Ranging Large Marine Vertebrates	Good	Good	Fair	Good
Overall Viability Rating for the Southern Belize Reef Complex				Fair

Summary of Conservation Target Viability for the Southern Belize Reef Complex

Conservation Action Planning for the Southern Belize Reef Complex

BELIZE

Conservation Action Planning is a structured approach to planning, implementing and measuring success for conservation projects such as that used for the Southern Belize Reef Complex.

Working with CAP in Belize has allowed planning for the Southern Belize Reef Complex to integrate broad scale participation in the planning process from a wide range of stakeholders – community, NGO, government agency, conservation field staff, private sector business and academic, to produce a plan for the future effective management of the Southern Belize Reef Complex at the system level, through collaboration. Incorporated within this are indicators for measuring success, facilitating adaptive management, improving effectiveness.

'Developing strategies, taking actions and measuring success at any scale'

Very Good	Functioning at its ecologically desirable status . Requires little human intervention
Good	Functioning within it range of acceptable variation. May require human intervention to maintain this status.
Fair	Outside its range of acceptable variation. Requires human intervention. - vulnerable to serious degradation if left unchecked,
Poor	If condition remains for extended period, restoration or prevention of extirpation will be practically impossible

Critical Threats

Coastal development in the coastal zone, resulting in clearance of Littoral Forest and Mangrove

Identification of Threats

Threats to each target were identified and rated, allowing prioritization of conservation actions and resources towards the most critical threats.

Three threats rate as **Very High** – coastal and caye development, fishing pressure, and climate change. This reflects the particularly heavy pressure on the natural resources from coastal developments, particularly in the Placencia area and on privately owned cayes, with impacts such as the removal of ecologically important mangrove areas, and dredging of the sea bed and shallow-water seagrass. It also highlights the impacts of over-fishing of the commercial fish stocks, and the need for tighter regulation of the number of fishermen, and effective implementation of surveillance and enforcement activities. Impacts of climate change, and the associated increasing water temperatures, resulting in coral bleaching and coral mortality, are related to more global issues.

Critical Threats

Very High

- Coastal / Caye Development
- Fishing Pressure
- Climate Change

High

- Aquaculture
- Agricultural Runoff
- Oil Spills
- Poor Fishing Practices

Threats Across Targets	Littoral Forest / Beaches	Coastal Lagoons and Estuaries	Commercial / Recreational Species	Mangroves	Coral Reef Communities	Spawning Aggregations	Large Marine Vertebrates	Seagrass	Overall Threat Rank
Coastal /Caye Development	Very High	Very High	High	High	Very High	High	High	Medium	**Very High**
Fishing Pressure	-	Medium	Very High	-	High	Very High	High	-	**Very High**
Climate Change	Very High	High	High	Medium	High	Medium	Medium	-	**Very High**
Aquaculture	High	Very High	Medium	High	Medium	Medium	Medium	Low	**High**
Agricultural Runoff	-	Very High	Medium	High	Medium	Medium	Medium	Medium	**High**
Oil Spills	Medium	Very High	-	-	Low	-	Medium	Low	**High**
Poor Fishing Practices	-	Medium	High	Low	Low	High	High	-	**High**
Visitor Impacts (tourists, researchers etc.)	-	Medium	-	-	Low	Medium	Low	-	**Medium**
Oil Exploration and Drilling	-	-	-	-	Low -	-	-	Low	**Low**
Overall Threat Status for Targets	**Very High**	**Very High**	**Very High**	**High**	**High**	**High**	**High**	**Medium**	**Very High**

Conservation Objectives

The overall conservation goal for the SBRC is to enhance the viability of each conservation target, and through these, the viability of the SBRC as a whole.

A framework for achieving this goal has been developed as an output of the CAP process, with a series of twelve prioritized conservation objectives.

Working together, using these Objectives and the linked Strategic Actions as guidelines, the protected area management, fisheries and tourism sectors will be able to achieve the vision of integrated, effective, system-level management of the SBRC.

Cross Cutting Strategic Actions

Some Strategic Actions cut across multiple objectives, building strategies that support the overall vision for the Southern Belize Reef Complex.

- **Strategic action:** Implement / enforce policies & regulations
- **Strategic action:** Develop and implement public awareness program
- **Strategic action:** Production of Annual state of the park / SBRC reports including monitoring / research output for SBRC area
- **Strategic action:** Implement an effective, standardized monitoring and data management

J. Stockbridge

Conserving today's resources for future generations

Conservation Objectives

Objective 1: By 2013, illegal fishing activities within the SBRC will be reduced to a level comparable with the Gladden Spit Marine Reserve's 2008 level.

Objective 2: By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet Environmental Impact Assessment, Environmental Compliance Plan and best practices standards, with independent monitoring in place

Objective 3: By 2013, all marine protected areas within SBRC will be able to obtain 50% of their annual budget through a secured diversified funding base - user fees, government, endowment, concessions, and environmental tax

Objective 4: By 2013, the level of agricultural contamination impacting the SBRC will be reduced from 2008 levels, through collaboration with other organizations and agencies that influence agro-chemical use and application

Objective 5: By 2013, the management agencies of the SBRC will have the legal framework and institutional capacity to undertake effective management of marine resources

Objective 6: By 2015, at least 50% of coral reefs and mangroves resilient to climate change located within the SBRC will be effectively protected.

Objective 7: By 2019, 20% of the current area of degraded littoral forest & sandy beaches within the SBRC will be restored

Objective 8: By 2019, populations of commercial / recreational species are increased by 20% from current stock assessments as a result of effective management

Objective 9: By 2019, populations of fish at Spawning Aggregation Sites will be stabilized & sustained within the SBRC through good resource-use practices

Objective 10: By 2019, the condition and extent of coral reef communities will be improved by 10%, through development and implementation of a coral reef restoration programme and associated public awareness activities

Objective 11: By 2014, all marine protected areas within the Southern Belize Reef Complex will have at least 20% of their area designated as no-take

Objective 12: By 2010, all petroleum-associated activities - transportation, exploration and extraction - within SBRC will comply with international and national environmental regulations and safety standards

Priority Conservation Objectives

As human and financial resources for conservation are limited, the Conservation Action Planning process identifies those targets and threats that are most critical, facilitating prioritization of conservation objectives and strategic actions. The highest priority areas are outlined below.

Objective 1: By 2013 illegal fishing activities within the SBRC will be reduced to a level comparable with the Gladden Spit Marine Reserve's 2008 level.

The SBRC is an important resource for many coastal communities engaged in artisanal and commercial fishing activities, from Sarteneja in the north to Monkey River in the south. Whilst the presence of commercial species such as grouper and snapper indicate that marine resources are relatively healthy by regional standards, the pressure on marine stocks is increasing, with an increasing number of fishermen, and incursions from neighbouring countries. Overfishing of commercial marine species has resulted in reduced catch per unit effort and a shift in the community and population structures of fish lobster and conch harvested within the area.


Graham/Hickerson

- **Strategic action:** Implement / enforce policies and regulations
- **Strategic action:** Implement an effective, standardized monitoring and data management program for the SBRC area
- **Strategic action:** Create an alternative livelihood program for fisher folk within the SBRC

Objective 2: By 2013, 15% of current and 75% of future coastal developments impacting the SBRC meet Environmental Impact Assessment / Environmental Compliance Plan and best practices standards, with independent monitoring in place

Land development in the coastal zone and cayes of the SBRC, whether for tourism or aquaculture, has resulted in the removal of a significant portion of littoral forest and herbaceous beach vegetation, which play a critical role in stabilizing island structure, reducing coastal erosion, beach loss and sedimentation. Their loss is accelerating as the developmental value and demand for beach frontage escalates. In addition, shoreline structures such as piers, marinas, and seawalls have led to loss and/or alteration of habitats.


Wildtracks


Wildtracks

Clearance on the cayes greatly undermines the stability of the islands themselves, making them, and any infrastructure thereon, a great deal more susceptible to the impacts of hurricanes. The long-term sustainability of caye-based tourism and residential developments can be made significantly more financially viable through the maintenance of this ecosystem.

- **Strategic action:** Develop or adopt best practices guidelines and certification programmes relating to coastal developments, and engage relevant stakeholders for implementation
- **Strategic action:** Implement an effective, standardized monitoring and data management program for the SBRC area
- **Strategic action:** Develop and implement public awareness program
- **Strategic action:** Implement / enforce policies & regulations
- **Strategic action:** Lobby Coastal Zone Management Authority and Institute, local and national Government Representatives and agencies for policy and zoning for the SBRC area
- **Strategic action:** Lobby for creation / adoption of navigation and oil exploration / extraction standards as needed, and enforce all such regulations

Rating Conservation Targets

Landscape Context:

An assessment of the target's environment ,including ecological processes and regimes that maintain the target occurrence (such as water quality, hurricanes and other natural disturbances), and connectivity, allowing access to habitats and resources or the ability to respond to environmental change through dispersal or migration.

Condition:

A measure of the biological composition, structure and biotic interactions that characterize the occurrence of a conservation target

Size:

A measure of the area or abundance of the conservation target's occurrence

Measuring success

Measuring Success

Indicators of success have been developed for measuring the impacts and effects of implementation of strategic actions within the SBRC, focused on monitoring of biodiversity viability, threat levels and achievement of objectives.

Monitoring Viability:

The viability of each conservation target has been rated on its Key Ecological Attributes, based on Landscape Context, Condition and Size. A series of indicators has been developed to measure the status of these attributes, and provide conservation managers with a means to measure the effectiveness of their strategies on the viability of the conservation targets.

Category	Key Ecological Attribute	Indicator
Landscape Context	Nutrient concentrations & dynamics	Water quality
Condition	Presence / abundance of key functional guilds	Density of Parrotfish
Size	Size / extent of characteristic ecosystems	% seagrass cover

Examples of Viability Indicators

Monitoring Objective and Strategy Success for Adaptive Management

Indicators are also tied to each objective, to provide a mechanism to measure success of the outcomes of strategy implementation.

Indicators of Objective and Strategy Success	
Objective	**Indicators of Success of Conservation Actions**
Objective 2. By 2013, 15% of current and 75% of future coastal developments impacting the SBRC will meet EIA ECP and best practices standards, with independent monitoring in place	▪ Total area of littoral forest / sandy beaches ▪ % coastal / caye developments that meet best practices standards (including aquaculture industry)
Objective 8. By 2019, populations of commercial / recreational species will be increased by 20%, based on assessment of current stocks and effective management	▪ Conch density ▪ Average Catch per man-hour (Catch per unit effort) ▪ Biomass of adult fish

Measuring success of conservation actions allows adaptive management, enabling conservation managers to keep abreast of the changing human landscape and develop new strategies to ensure continued management effectiveness into the future.

Never doubt that a small group of thoughtful, committed citizens can change the world; indeed, it's the only thing that ever has...

Margaret Mead