The Federated States of Micronesia

Yap Biodiversity Strategy and Action Plan

2018–2023

Foreword

The Yap State Biodiversity Strategy and Action Plan (BSAP) is the product of the vision and hard work of the Yap State Environmental Stewardship Consortium (ESC) and many dedicated individuals and agencies when drafted in 2004. With the guidance of the FSM Biodiversity Unit under the Department of Economic Affairs and funding support from the Global Environment Facility, the YBSAP was completed in September 2004. The participatory involvement of the communities through their representatives on the ESC proved highly valuable in ensuring a comprehensive state-wide consultation process, the inputs from which fed into the Yap BSAP.

This revision to the Yap BSAP, facilitated by the FSM Department of Resources and Development and supported by the Micronesia Conservation Trust (MCT) and United Nations Development Programme (UNDP) has been completed in 2018 through State-level consultations and a Validation Workshop organized by the aforementioned entities; this revision involved many Yap stakeholders and allowed for a stock-take of the progress made with efforts and activities, and the challenges that remain. The revision and update of the YBSAP with its linkages to the National Biodiversity Strategy and Action Plan (NBSAP), which has been concurrently revised, continues to guide and serve as a roadmap for the activities and efforts to be carried out under our environmental stewardship and resource management programs. Most importantly, this revised Yap BSAP reiterates the goal of ensuring that our resources are utilized sustainably for the benefit for all generations of Yapese.

Yap State treasures its diversity and seeks a future in which its cultures and traditions remain the cornerstone of its development. We seek partnership with our neighbors and beyond to develop our local capacity to ensure the sustainable management of our resources. As we strive to achieve these goals, we must never lose sight of the fact that our cultures and traditions are interwoven into the very fabric of our natural environment.

For these reasons, I hereby endorse the Yap State Biodiversity Strategy and Action Plan.

Endorsed this _____ day of _____, _____.

JAN 0 8 2019

Governor of the State of Yap

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Acknowledgements

The Yap State Biodiversity Strategy and Action Plan (BSAP) 2018–2023 would not have been possible without the great efforts of a large number of people from a number of government agencies, non-governmental organizations, community-based organizations and communities, who gave freely of their time, their experience and invaluable expertise. This has enabled this revised plan to reflect not only the priorities of Yap today, but also the considerable ongoing efforts being made to conserve biodiversity and support sustainable development across the State.

The development of this plan was made possible through the generous financial support of the United Nations Development Programme.

The Yap BSAP revision process was coordinated and facilitated by the Micronesia Conservation Trust, with many people from a great number of organizations, both governmental and non-governmental, and communities contributing to the consultation and validation workshops, and providing essential additional information. It is these people that have made the development of this Yap BSAP possible:

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Introduction

Yap is the western-most state within the Federated States of Micronesia and is unique in the FSM in having metamorphic rock derived from tectonic activity and associated soils similar to continental areas, as well as old volcanic soils. The islands and atolls of eastern Yap are younger and made of limestone. Home to 11,377 people, the population density of Yap rises from 247 per sq. mile in Yap Proper, to 527 per sq. mile across the outer islands (FSM Office of Statistics, Budget, Overseas Development Assistance and Compact Management, n.d.).

Yap is culturally unique within the FSM for its stone money, stone pathways and traditional village meeting houses. Much of the land and even near shore areas have been modified through landscape architecture for food production purposes. The island once supported a very dense population that greatly influenced the landscape and cultural patterns. The traditional agricultural system of Yap is the most diverse in the FSM and incorporates ditching and landscape architecture to manage water flow through both shifting and site-stable systems. The species and variety-rich tree garden/taro patch agroforests of Yap represent a well-developed system of permaculture.

The average annual income from wages in Yap is $11,804, just slightly higher than the national average of $11,386. Much of the population remains dependent on the land and sea for food, with approximately 95% of households engaging in at least one subsistence activity (agriculture and forestry, handicraft and home production, livestock and aquaculture, or fishing, hunting and gathering), slightly higher than the national average of 77% (FSM Office of Statistics, Budget, Overseas Development Assistance and Compact Management, 2014).

The FSM is a constitutional democracy, operating at national, state, municipal and traditional levels, with most power delegated to the four states by the national constitution. The State Government of Yap contains the usual executive, legislative and judicial branches, and is the only state to constitutionally provide for a traditional leadership branch to State Government with its Councils of Chiefs. The state government holds jurisdiction over coastal waters up to 12 nautical miles from land. Beyond this, the National government has jurisdiction over the remainder of the EEZ, i.e. from 12 nautical miles to 200 nautical miles from land.

Systems of land ownership and tenure differ across the four states of the FSM. Land ownership in the FSM is limited to citizens of the FSM only, with land lease terms varying by state (US Department of State, 2017). In Yap, the majority of land and near-shore marine areas are privately owned, and utilization of these areas is under traditional control. Resources have historically been subject to a complex system of allocation that saved Yap from the 'tragedy of the commons', where resources available to all are used up or destroyed. Today the traditional system is fading or being modified in response to the availability of new technologies and opportunities for commercial exploitation of natural resources and income from foreign investment seeking long-term leases. The traditional system nonetheless sets a cultural precedent for the management of people's use of resources.

The FSM experiences a tropical climate, with consistently warm weather driven by the north-east trade winds. The average annual temperature in Yap in 2017 was 82.3°F (NOAA NCEI, 2018). There is little variation throughout the year, with the high islands such as Yap being generally hot and humid. Rainfall across the FSM is generally plentiful, with Yap receiving approximately 140 inches in 2017. (NOAA NCEI, 2018).

The FSM is strongly affected by the El Niño Southern Oscillation (ENSO), which has a particularly forceful influence on minimum air temperatures during the wet season (Australian Bureau of Meteorology and CSIRO, 2011). El Niño is also associated with reduced rainfall during the dry season. La Niña years are associated with extremely high tides in the FSM, which can lead to seawater inundation of crops and freshwater supplies (Fletcher & Richmond, 2010). The FSM is also vulnerable to extreme weather-related events, particularly typhoons, storm waves, flooding, landslides and drought.

Air and sea surface temperatures in the FSM are increasing, with waters around the FSM warming by approximately 0.11°C per decade in the eastern regions of the country and by 0.8°C per decade in the western regions since 1970 (Australian Bureau of Meteorology and CSIRO, 2011). Under a high emissions scenario, temperature increases greater than 2.5°C by 2090 are projected with high confidence for the FSM, with a similar temperature increase projected for the ocean surface (Australian Bureau of Meteorology and CSIRO, 2011).

Annual rainfall is also projected to increase, somewhere in the range of >5% and >15% by 2090 depending upon the model used and the specific location within the FSM (Australian Bureau of Meteorology and CSIRO, 2011). Increasingly intense rainfall events, particularly when following drought conditions, are increasing sedimentation run-off and coastal erosion, which in turn impacts essential marine ecosystems, such as seagrass meadows, and in turn marine productivity (Houk et al, 2013).

Of particular importance to the FSM, owing to reliance on near-shore coastal fisheries and the low-lying nature of many of its islands, are ocean acidification and sea level rise. In the case of ocean acidification, this is projected to rise throughout the 21st century resulting in reductions in the available form of calcium carbonate necessary for coral growth (Australian Bureau of Meteorology and CSIRO, 2011). As regards sea level, models suggest a rise of approximately 2–6 inches by 2030, and of approximately 8–24 inches by 2090 under a high emissions scenario (Australian Bureau of Meteorology and CSIRO, 2011). More than 80% of communities in the FSM are vulnerable to sea-level rise and flooding, given that most villages and settlements are situated in either coastal areas or in areas around

rivers and streams (FSM, 2018). A 2010 study using the Coastal Module of the integrated Climate Framework for Uncertainty, Negotiation and Distribution assessment model suggested that a 1-meter sea-level rise by 2100 would incur damage costs in excess of 5% of GDP in the FSM (Anthoff et al, 2010).

A number of sectors within the FSM economy are recognized as being vulnerable to climate change, including fisheries, agriculture and tourism (FSM Department of Finance and Administration, 2018). These three sectors are also the focus of private sector investment, being considered as offering the greatest opportunities for short and long-term economic growth in the FSM (FSM, 2004), with all three dependent upon a healthy environment and thriving biodiversity, which are themselves also considered highly vulnerable to climate change (FSM Department of Finance and Administration, 2018).

Yap State Vital Statistics

Geography	
Location	7°–10° N, 137°–148° E
Number of islands	138 (four closely associated islands form Yap Proper, plus 134 low coralline islands and atolls)
Land area	49.7 sq. miles
Forest (including agroforest)	26.8 sq. miles (17,176 acres)
Non-forest vegetation	7.9 sq. miles (5,078 acres)
Cropland	0.02 sq. miles (14 acres)
Urban (including urban cultivated)	1.6 sq. miles (1,020 acres)
Other (including water)	0.8 sq. miles (516 acres)
Ocean area	> 100,000 sq. miles
Climate	
Annual average temperature (2017)	82.3°F
Rainfall (2017)	140 inches
Demographics	
Population	11,377
% of total FSM population	11.1%
Population density	247 per sq. mile (189 per sq. mile on Yap proper and 572 per sq. mile across outer islands)
Economics	
Average annual income (wages)	$11,804
% households involved in subsistence activity	95%
% contribution to national total household income	14.8%

Biodiversity in Yap

Biodiversity across the FSM is incredibly rich, with FSM recognized as part of the globally important Polynesia-Micronesia biodiversity hotspot (CEPF, 2007). There are two terrestrial ecoregions within the FSM, one of which is the Yap Islands State ecoregion, while the Islands of Yap, Chuuk, Pohnpei and Kosrae together form the other (WWF, 2018). Much of the Yap Islands State ecoregion is open savanna with secondary tropical dry forest. It contains three endemic bird species, which provide the basis for its ecoregion status, while also being home to a number of species with restricted ranges. Yap is also home to nine species of endemic plants (Costion & Lorence, 2012) and a recently described endemic snake in Ulithi (Falanruw 2009, Wynn et al 2012). Yap is the most biologically diverse island in the FSM.

The waters of the FSM are home to 1,221 species of fish. Of these, 1,070 are associated with the extensive reef system (Froese & Pauly, 2018). In fact, the wider Micronesia region is estimated to contain 4% of the world's coral reefs, with reefs a defining feature of the FSM.

The basis of the reefs, the corals themselves, are incredibly diverse in the waters of the FSM, with both soft and hard/stony corals extensively represented. The International Union for Conservation of Nature (IUCN) Red List of Threatened Species lists 427 species of coral in the FSM's waters, 100 of which are considered to be vulnerable and three endangered (IUCN, 2018). Biological surveys of reefs across the FSM have assessed the percentage of reefs that can be considered to be above the 'effectively conserved' threshold in the context of the Micronesia Challenge, based upon a number of criteria contributing to an overall ecosystem condition score. In Yap, 50% of outer reefs, 20% of channel reefs and 75% of inner reefs meet the threshold. The data from these surveys also demonstrated that fishing pressure was a primary determinant of reef condition.

The FSM also supports approximately 36.3 sq. miles of mangrove forest across the islands, approximately 4.1 sq. miles of which are in Yap (Donnegan et al, 2011). Approximately 13% of Yap's vegetation consists of mangroves (Falanruw et al. 1987), and research shows that they sequester 33% of the carbon removed from the atmosphere by Yap's vegetation (Donato et al. 2012, 2011).

Indeed, much of the FSM is covered with forests, and while Yap is no exception with an estimated 26.8 sq. miles/57% of the islands forested, it also contains more non-forest vegetation than any of the other states, with approximately 6.4 sq. miles of savanna or other scrub or grassland (Donnegan et al, 2011). Upland forest covers 12.1 sq. miles of Yap, with swamp forest covering 62 acres and agroforest covering 10.5 sq. miles (Donnegan et al, 2011). Cropland accounts for only approximately 14 acres of land in Yap, and areas classified as 'urban cultivated' account for 299 acres (Donnegan et al, 2011). It should be note that the limited area mapped as cropland is not indicative of limited food production as most traditional food production occurs in agroforests, "urban cultivated" areas, taro patches and in shifting gardens that can't be discerned on aerial or satellite imagery.

It is recognized that a number of threats to the biodiversity of Yap, and the entire FSM, exist. These threats, which have been identified at a national level and are also relevant to Yap State, comprise:

- Environmental conversion and degradation
- Over-exploitation of resources
- Waste management and pollution
- Invasive and alien species
- Climate change
- Infrastructure development.

In light of these threats, since the development of the initial Yap BSAP in 2004, significant developments toward comprehensive biodiversity conservation in Yap and throughout the FSM have been undertaken. Over time a network of strong partnerships between the national and state governments, local governments and communities, partners such as the University of Guam who provide technical expertise and the U.S. Forest Service PSW who provide technical expertise and grant support through the State and Private and Cooperative Fire Grants programs, and various conservation organizations, such as The Nature Conservancy and the Micronesia Conservation Trust, amongst many others. Programs supported by the MCT focus on biodiversity conservation, climate change adaptation and sustainable development throughout the FSM and wider Micronesia region, with the MCT playing a vital role in conservation in Yap.

Perhaps the most significant conservation initiative to come about since the initial Yap BSAP was drafted is the establishment of the Micronesia Challenge in 2006. At that time, the FSM, along with the Republic of the Marshall Islands, the Republic of Palau, Guam, and the Commonwealth of the Northern Mariana Islands (CNMI), developed and committed to the Micronesia Challenge, which has the dual aims of conserving 30% of near-shore resources and at least 20% of forest resources across Micronesia by 2020 (Micronesia Challenge, n.d.).

The Micronesia Challenge has been a catalyst for creating a regional web of mutually reinforcing projects, programs, and peer-learning networks to improve the condition and management of essential ecosystems and natural resources. Reflecting the region's diverse resource tenure systems and traditional management practices, national and sub-national government agencies with policy, regulatory,

and enforcement mandates are partnered with non-governmental organizations (NGOs) with conservation and community outreach and mobilization skills to work with communities and traditional leaders to manage resources, conserve biodiversity, and increase ecosystem and community resilience to climate change. International universities, institutes, and conservation organizations provide scientific knowledge and support, while regional peer-learning networks connect resource managers and NGOs from across the Micronesia Challenge, functioning as capacity building and knowledge sharing platforms.

In working to achieve the Micronesia Challenge marine and terrestrial targets, government and non-government partners across the FSM have championed the creation of new terrestrial and marine protected areas. The FSM National and State governments and their numerous partners are also working towards sustainable financing for protected areas. This includes the FSM's Micronesia Challenge Endowment Fund sub-account that was established as a result of the FSM's commitment to the Micronesia Challenge, and which is administered by the MCT to support protected area management through contributions and investments. As of October 2017, this Endowment was valued at just over $5.7M.

An ecoregional planning approach to biodiversity conservation has been adopted in the FSM. This approach, which prioritizes areas of conservation need to build a portfolio of conservation targets, allows for the development of a conservation plan for a nation containing myriad species of national and global importance for which the development and implementation of individual conservation and management plans would be impossible (The Nature Conservancy, 2003). One hundred and thirty Areas of Biodiversity Significance (ABS) were identified across the FSM, thirty two of which are in Yap. These comprise three terrestrial sites totaling 2.52 sq. miles, six marine sites totaling 190.95 sq. miles, twenty one coastal marine sites totaling 92.66 sq. miles and two coastal freshwater sites totaling 0.12 sq. miles (The Nature Conservancy, 2003).

Various figures exist for the number of areas under protection in Yap, however, a 2009 nationwide gap analysis of protected areas suggested that at that time 246.5 sq. miles of terrestrial and marine environments (predominantly marine) were under protection in the state (MCT, 2009). An additional 42.8 sq. miles are considered to be outside of protected areas but within ABS Action Sites, while a further 82.1 sq. miles are outside of both protected areas and ABS Action Sites but are within ABS Standard Sites, thus representing good conservation features (MCT, 2009).

Background to the Revised Yap Biodiversity Strategy and Action Plan

Development Process for the Revised Yap BSAP

The first Yap Biodiversity Strategy and Action Plan (BSAP) was introduced in 2004, following its development by the Yap State Environmental Stewardship Consortium (ESC) working in collaboration with a Yap BSAP taskforce created by the Governor.

Oversight of this current revision process was provided by the Micronesia Conservation Trust, and a process of research, consultation and validation was followed. The objectives and actions as defined in the initial Yap BSAP were taken out to consultation, and a multi-stakeholder group was engaged in a two-day workshop to review the BSAP for ongoing relevance, identifying what progress had been made, where additional efforts were needed under current objectives and actions, and where new actions were required. The group comprised government officials, regional, state and community NGO representatives, technical experts, scientists, researchers and educators involved in environmental education.

In addition to these consultations, a specific women's focus group was held to ensure that the different interactions with and observations of biodiversity experienced by women in Yap were understood and incorporated into the revised BSAP.

Following this process, a revised document was developed, which was then circulated to a select group from the original consultations, who then convened for a further two-day validation workshop.

This process was part of a wider set of consultations undertaken as part of the revision of the National Biodiversity Strategy and Action Plan (NBSAP). The revision of the NBSAP took account of each of the states' revised BSAPs, as well as being consulted upon separately. By following this process, it is intended that the NBSAP and individual state BSAPs are mutually supportive and reflect each other.

It is clear in Yap, owing to the unique land tenure system, that the people are the key to the success of biodiversity conservation efforts. Consent and participation from individuals and communities is essential for any biodiversity conservation projects to be established, implemented, and continued. The Yap State BSAP objectives and actions have been developed to appropriately reflect this situation.

The Yap Biodiversity Strategy and Action Plan

Vision

We are mindful that our environment and our natural resources are all important, for they are the foundation of our economies, our cultures, and our identities as Pacific Islanders." (Declaration of the First Micronesian Traditional Leadership Conference, 1999).

We, the people of Yap State are mindful that our culture, economy and very lives are dependent on our biodiversity. Our islands are small and dear, and there are limits to how much they can be exploited. There are, however, no limitations to making Yap better and better. We aspire to understand and protect our biodiversity and to continue to improve conditions for life on Yap.

We seek to maintain a partnership and balance with Yap's biodiversity. We do not want to become obligatorily dependant on the world's economic system for our lives, but desire to retain the option to live according to our own values and to be able to subsist on our own natural resources should we chose to do so. In order to maintain this basic freedom for Yapese people, it is necessary to maintain the integrity of Yap's living ecosystem.

As we become better stewards of our biodiversity, we will develop ways to sustainably use our natural resources to enable us to participate in the world's economic system. As we achieve economic development that is ecologically sustainable, we will become one of the most modern nations of the world of the future when the way a country cares for its biodiversity is the highest art.

We wish to retain the wisdom and enhance the skills of our island culture heritage, to live with respect for one another and with a reverence for life on our islands amid clean flowing waters, green healthy lands and a productive marine system that contributes to the health of the world environment.

Goal

The overall goal of the Yap BSAP is to "Take Care of Yap" in keeping with the mandate of Traditional Leadership at the Yap State Summit (1996).

This goal will be achieved through:

- Integration of biodiversity conservation and sustainable development
- Securing traditional empirical knowledge and technologies and enhancing it with modern science into a neo-traditional system of natural resource management suitable for today's context
- Development of local capacity to manage natural resources on a sustainable basis
- Community-based approaches
- Taking a precautionary approach (maintaining the "wisdom in the basket")

The initial Yap BSAP also contained the following specific objectives:

- Record (inventory), monitor and maintain indigenous species biodiversity
- Maintain critical natural resource areas, species and systems including at least 20% of critical marine areas and all remaining areas of well-developed native forest
- Secure a traditional empirical knowledge base and technologies and enhance the traditional system with modern science where appropriate
- Enable adequate education of environment and biodiversity professionals in parallel with the development of the means to employ them
- Devise a process to assure that development is ecologically sustainable
- Assist resource owners to manage their natural resources on a sustainable basis
- Develop economic alternatives for using biodiversity on a sustainable basis

Strategy and Action Plan

The initial Yap BSAP grouped actions under the following action areas:

- Institutional Arrangements ("Getting our act together")
- Secure and Enhance Traditional Knowledge (Build on what we already know)
- Inventory and Monitoring ("Counting our blessings" and identifying problems)
- Biosecurity – Addressing Invasive Species and Other Threats to Biodiversity
- Managing Pollution
- Environmental Awareness, Research and Capacity Building
- Stewardship Programs and Environmentally Sustainable Industries

These action areas remain relevant and so this revised Yap BSAP utilizes them as objectives under which revised and updated actions are described. Where it is useful to do so, a timeframe has been associated with actions, along with identification of those with responsibility for carrying out the action.

Objective 1

Institutional Arrangements

The actions included in the initial Yap BSAP were as follows:

- Support the Environmental Stewardship Consortium (ESC) to work as the Yap State counterpart to the President's Environmental Management and Sustainable Development Council (SDC) as indicated in the NBSAP. ESC staff will work with the Consortium to:
    - Develop and monitor indicators of sustainable development
    - Manage a geographic information system (GIS)
    - Coordinate efforts carried out under the Convention on Biological Diversity, the Framework Convention on Climate Change, and other related conventions
    - Coordinate a program of sustainable development
- Pass pending legislation to establish a Coordinated Project Review Process (CPRP) and Natural Resources Stewardship Council (NRSC) in order to provide a clear and orderly process for community involvement and environmental review of proposed projects including bioprospecting and research projects
- Define the roles and responsibilities of government agencies whose work relates to biodiversity: Agriculture, Forestry, Yap Fishing Authority and Marine Resources Management Division

Progress to date

Somewhat limited progress has been made under this objective. The Environmental Stewardship Consortium is currently inactive in Yap. However, it is clear that there are a number of environmental groups and councils placing increasing pressure on attendees' time, and a reinvigorated Environmental Stewardship Consortium could act as a useful hub and so lessen the burden of individual meetings.

The inactivity of the Environmental Stewardship Consortium has resulted in little action in the related areas, for example indicators of sustainable development have not yet been developed. No centralized coordination of work under the various environmental conventions that the FSM is signatory to has been undertaken in Yap, although different agencies are coordinating different activities. This, again, highlights the potential benefit of a re-instated Environmental Stewardship Consortium. There is ongoing work to managing a geographic information system (GIS). While numerous environmental programs are in place, these are not necessarily sustainability-focused, and are subject to funding limitations.

Several attempts to pass legislation to establish a Coordinated Project Review Process and Natural Resources Stewardship Council have been made, but these have not yet been successful. Similarly, an overall defining of government agency responsibilities regarding biodiversity-related work has not yet been achieved.

Updated actions:

1. Identify an appropriate champion to reinvigorate the Environmental Stewardship Consortium as a body to bring together all agencies and groups undertaking biodiversity-related programs and activities, or establish a Yap-wide environmental non-governmental organization as an appropriate alternative (1st Year – YapCAP and RD)
2. Set up an online platform for information sharing between participants in the Environmental Stewardship Consortium (or alternative body) and with appropriate agencies and organizations (1st Year)
3. Appoint a contractor to develop indicators of sustainable development (1st Year – RD, EPA)
4. Train local personnel to coordinate with current geographic information system (GIS) staff and to act as a coordinator for activities under the Convention for Biological Diversity and the Micronesia Challenge (1st Year – Division of Land Resources)
5. Develop and coordinate a program of sustainable development (Year 2 - RD, EPA)
6. Appoint a champion who will define the roles and responsibilities of all government agencies, non-governmental organizations and community-based organizations whose work relates to biodiversity, and who will identify where work is being duplicated and can be made more efficient (Year 1, Governor's Office)
7. Increase consultations with traditional leaders to at least twice a year (Year 1, at least twice a year – Lead for ESC)
8. Establish a Coordinated Project Review Process (CPRP) via Executive Order or Resolution to provide a clear and orderly process for community involvement and environmental review of proposed projects including bioprospecting, research projects, foreign investment and long-term leases, and proposals for unsustainable fishing ventures such as the Live Reef Food Fish Trade (LRFFT) that targets spawning aggregations of fish (Year 1, Governor's Office supported by RD and EPA)

Indicators

Key indicators under this objective will include whether the Environmental Stewardship Consortium (or equivalent active) is established and active, and the degree to which biodiversity-related programs and activities are coordinated and streamlined across Yap. Other indicators include, but are not limited to, the appointing of appropriate coordinating personnel, the development of sustainable development indicators and the establishment of a sustainable development program.

Constraints

Funding will be the main constraint to achieving the actions under this objective. Lack of achievement of the first action, related to reinvigorating the Environmental Stewardship Consortium (or alternative body), will itself be a constraining factor to the other actions under this objective.

Objective 2

Secure and Enhance Traditional Knowledge

The actions included in the initial Yap BSAP were as follows:

- An ongoing project will result in an overview of traditional use of the land and sea on Yap that will provide a context for local projects as appropriate to individuals, families and communities
- An evaluation of traditional ways to manage erosion and sedimentation, and ways of integrating traditional controls on resource exploitation with modern management practices, is needed
- Where appropriate, results of projects can feed back into the program and be linked with scientific principles so that they may be further enhanced to provide viable and locally relevant alternatives for the future

Progress to date

Some progress has been made under this objective (Falanruw, 1992a & b; Falanruw, 1994a & b). Ongoing management planning with communities utilizing the Local Early Action Planning for Climate Change (LEAP) toolkit and other participatory tools is undertaken, and the traditional use of resources and knowledge are documented within those plans developed by communities. This is mainly being done on Yap Proper. However, there have been activities in the neighboring islands, notably led by the One People One Reef community group conducting outreach and awareness of reef health in Ulithi atoll and reaching all of the neighboring islands thus far except two, Eauripik and Fachailep.

The gathering of fishing and agricultural stories is also performed on Yap Proper and the outer islands, with the linking of these to the scientific knowledge base carried out for validation of traditional practices and knowledge. A good degree of research on the traditional use of land and the marine environment have also been carried out (see citations).

A specific example of linking projects to scientific principles relates to the Nimpal Marine Conservation Area, where adaptive management planning took place at the beginning of 2018, utilizing the Socio-Economic Monitoring Pasifika (SEM-P) toolkit and the Marine Protected Area Management Effectiveness (MPAME) tool. The One People One Reef community group and project has also led marine outreach and awareness activities in Ulithi atoll and the neighboring islands, working with international universities and organizations to conduct ecological assessments and other surveys to monitor marine reef health.

Updated actions:

1. Continue to document traditional use of the land and sea on Yap to provide context for local projects as appropriate to individuals, families and communities (Every year, maintained; YapCAP and HPO)
2. Document and evaluate traditional ways to manage erosion and sedimentation, and evaluate ways of integrating traditional controls on resource exploitation with modern management practices (Every year with action item list developed, subsequently implemented and maintained)
3. Link projects results with scientific principles where appropriate, so that they may be further enhanced to provide viable and locally relevant alternatives for the future (Every year, maintained; Yap and HPO utilizing the platform identified and established under 'Institutional Arrangements')
4. Support additional personnel to aid in the collecting and documenting of traditional knowledge and arts, and support expert traditional practitioners so that they may continue to practice and pass on their knowledge and skills with that knowledge held by elders a priority (Year 1)

Indicators

The main indicator under this objective will be the number of community-endorsed LEAP plans and management plans that are drafted and implemented, with strong linkages to traditional knowledge through the number of documented aspects of traditional knowledge throughout the State.

Constraints

Transportation is a major constraint as reaching remote outer islands is particularly difficult, with a high time and cost burden. Community scheduling can also be a constraint owing to multiple commitments within communities. A lack of government conservation officers to enforce laws appropriately is also an issue under this objective, and the previous objective.

Objective 3

Inventory and Monitoring

The actions included in the initial Yap BSAP were as follows:

- Survey and mapping of terrestrial and marine communities
- Map current patterns within Yap's lagoon
- Inventorying species within natural communities
- Incorporating this information into a GIS system
- Updating maps and information on species incidence
- Analysis of data to determine trends
- Establishment of a State biodiversity database
- Identification of rare species

Progress to date

Some good progress has been made under this objective (Falanruw et al, 2010; Falanruw, 2015). Weloy Terrestrial Protected Area, Tamil Marine and Terrestrial Protected Area, and Rull, Nimpal and Malay/Thabeth Marine Protected Areas have all been certified and community endorsed, and all are surveyed on an annual basis. The Micronesia Protected Area Management Effectiveness (MPAME) tool is being utilized in a number of these sites. In addition, a fruit bat sanctuary has been proposed and the Yap Protected Area Network regulations are being worked on.

Mangyol has been proposed as a World Heritage Site, with associated mapping of the central and buffer areas demonstrating the presence of endemic trees (native dwarf forest) in the buffer area. It is also recognized that many of the uninhabited outer islands would benefit from a serial World Heritage status, owing to the presence of sea turtle rookeries, sea birds and endemic reptiles. Rapid Ecology Assessments of five uninhabited islands in Ulithi have been completed.

Marine mapping and monitoring occur annually, with results communicated to the relevant communities. This work is funded through the Micronesia Conservation Trust and led by the Yap Community Action Program (YapCAP) with technical assistance from the University of Guam Marine Lab and supported by a US National Oceanic and Atmospheric Administration (NOAA) Cooperative Agreement/Grant. Mapping of currents and water sampling has been carried out in one community watershed and managed conservation area as a pilot project to examine the influence of the watershed on the nearshore marine environment.

Inventorying of species is carried out as part of the annual monitoring of protected areas. However, this information has not yet been incorporated into a geographic information system (GIS). A web viewer of terrestrial data linking GIS plot points with the Micronesia Challenge Forest Inventory Assessment data is currently in development. In general, however, more surveys are needed to enable comprehensive updating of maps with species information.

Where marine data are collected during annual monitoring surveys, these are analysed by the University of Guam Marine Lab. Whilst this is an essential resource, it can be slow owing to capacity limitations, with subsequent monitoring survey planning underway before results of the previous surveys are able to be fully analysed.

A state biodiversity database has not been developed, although an online coral reef database utilizing data from reef monitoring surveys has been at the UOG Marine Lab. There is currently no official list of rare species within the state. Further regular surveys are required to support the development of this.

Updated actions:

1. Recruit a Protected Area Network Coordinator (Year 1, DRD)
2. Continue to certify new marine protected areas (Year 2, DRD)
3. Demarcate terrestrial protected areas appropriately (Year 2, DAF)
4. Continue regular surveying and mapping of terrestrial and marine communities and protected areas (Every year, MRMD, YapCAP, and DAF)
5. Develop maps of current patterns within Yap's lagoon, and develop indicators for influence of land run-off
6. Comprehensively inventory species within natural communities and incorporate species information into a geographic information system (GIS) (1st Year, utilize SEA through R2R and Champion)
7. Update maps with regard to species incidence (3rd Year)
8. Analyse data to identify trends and/or patterns (2nd Year)

9. Establish and maintain a Yap State biodiversity database (2nd Year)
10. Develop an official list of rare species and share with leadership and communities for action (5th Year)

Indicators

The main indicators under this objective will be a growing body of data from monitoring surveys, and the development of up-to-date maps delineating protected areas and containing species occurrences.

Constraints

Funding is likely to be a major constraint under this objective, along with the prioritization of available funds. The need for ongoing training to enable monitoring surveys to take place and the human capacity to undertake community engagement activities will also be constraining factors. The capacity of external partners to undertake data analysis will also be an increasing issue if the amount of data collected increases significantly.

Objective 4

Biosecurity – Addressing invasive species and other threats to biodiversity

The actions included in the initial Yap BSAP were as follows:

- Invasive species:
  - Establishment of an invasive species subcommittee of the ESC
  - A public awareness program will be conducted to acquaint people with "categories of species" including endemic, native, introduced, cultivated, weedy and invasive species
  - The dangers of invasive species and the need for a good quarantine program will be explained
  - Lists of invasive species threats to Yap such as those listed in Space and Falanruw (1999) and the NBSAP will be prioritized and a program developed to address them
  - A program to eradicate Yap's 2 worst invasive species and to monitor results via GIS and Public participation will be carried out in the first 5-year period of this YBSAP
  - An invasive species 'swat team' will be organized for emergency response
  - A strategy for combating an explosion of invasive vines following typhoon Sudal will be developed
  - A rat control program will be developed
  - Assistance will be requested from the SPC, and links established with Palau's visiting veterinarian program to obtain the services of a veterinarian for a neutering and spaying program to manage the population of cats and dogs
  - Surveys of other pests and diseases as well as marine invasives will be conducted
  - An invasive species coordinator will take part in an international invasive species and pest and disease network
- Unsustainable Exploitation of Natural Resources:
  - Careful evaluations are needed before resources are commercially exported as the Yap ecosystem is nutrient-poor and cannot produce a great surplus
  - Any proposed export should be subject to the "precautionary principle" (e.g. wisdom in the basket) and disallowed until it is shown to be sustainable
  - Action is needed to implement the ban on commercial export of in-shore/ near shore marine resources called for by the First Yap State Economic and Social Summit (1996) especially the Live Reef Food Fish Trade that targets spawning aggregations
  - It is important to salvage old posts and already downed trees and to find other alternatives for house posts, rather than cutting down the limited number of large living trees left in our damaged forests. Data on Yap's timber resources gathered should be updated and interpreted in terms of sustainable harvest, and the milling of local hardwood trees for non-traditional use and export of local timber should be banned as it robs Yapese culture of the materials it needs for expression
- Wildfires:
  - The YBSAP wildfire program will include the establishment of a wildfire subcommittee of the ESC and development of a 2nd 5-year wildfire plan
  - This plan will develop a strategy for wildfire management, building on 4 years of data on wildfires and a wildfire vulnerability map, and include the development of a Public awareness program featuring "Smokey Fruit Bat" and his "Cousin Ngobchey Smokey Bear"
  - Also associated with the wildfire abatement program will be one or more workshops on the Incident Command System (ICS) that can be used to address emergencies such as large wildfires, oil spills, and typhoons
- Climate Change:
  - A comprehensive program on "climate proofing" will be developed under the Convention on Climate Change, however some aspects of the issue might be addressed under the YBSAP. These include projects to secure taro patches from impacts of sea level rise, and the development of appropriate strategies for mitigating coastal erosion, including obtaining advice from SOPAC and evaluating the experience of Kiribati in planting mangroves for coastal protection on atolls

Progress to date

There has been some good progress under this objective. With regard to invasive species, a Yap Invasive Species Taskforce has been established and a strategic action plan developed. Success has been demonstrated in the control of the grass *Imperata cylindrica.* Comprehensive invasive prevention preparations were put in place for the 2018 Micronesian Games, and public information is displayed regarding rhinoceros coconut beetles and little fire ants, with information about little fire ants also broadcast on the radio.

The Micronesia Challenge Forest Inventory Assessment includes criteria related to invasive species, and funding for future programs will be made available under the sixth replenishment of the Global Environment Facility endowment.

There is a recognized need for more training of quarantine staff, and for more information regarding invasive species to be available at transit ports for people travelling to Yap, i.e. Palau and Guam.

In terms of the populations of cats and dogs in Yap, spay and neuter clinics are run on an ad hoc basis when funding becomes available.

As regards the unsustainable exploitation of natural resources, state laws are in place, however, there is no or little enforcement. At present Yap has no conservation officers. Harvesting of native trees, which is related to sawmill activity, is known to be unsustainable, and while some Yap Forestry and replanting programs are in place, many of the plantings succumb to wildfires and native hardwood trees are being harvested faster than they are replaced.

The actions in relation to wildfires have been effectively addressed, with three five-year wildfire plans developed and successfully transitioned to community wildfire prevention plans. Wildfires in Yap have been tracked for the past 14 years. Incident Command System training was delivered prior to typhoon Sudal by the United States Forest Service, with subsequent increased agency involvement.

Relating to climate change, taro patches have been mapped with GPS and linked with digital elevation models to identify their vulnerability to sea water inundation, with the salinity of taro patches being studied through a U.S. Forest Service grant in cooperation with YapCAP. A watershed-based approach to food security and sustaining biodiversity on Yap has been completed (Ruegorong et al, 2016). Results of the project will be published in a forthcoming book, and data on each of Yap's watersheds will be made available to Yap's communities. The Catholic Relief Services is working with communities to evaluate food security and vulnerability and a number of community climate adaptation plans have been developed. A directive from the Governor's office identifies climate change as a focal point for action in Yap and, whilst no specific climate change policy in place, the Yap Joint Strategic Action Plan calls for large expenditures for climate adaptation measures through infrastructure.

The importance of mangroves for carbon sequestration has been demonstrated through research carried out on Yap (Donato et al. 2011, 2012). Areas within which there has been some mangrove dieback have been mapped by the U.S. Forest Service using satellite imagery to augment aerial surveys and there are some efforts to replant mangroves in areas where there has been dieback.

Updated actions:

1. Invasive species awareness program (DAF):
    a. Utilize the Yap Invasive Species Taskforce as main entity supporting invasive species management
    b. Conduct a public awareness program to acquaint people with invasive species and their dangers
    c. Work with quarantine offices in Palau and Guam to develop effective prevention of invasive species entering Yap, e.g. pre-screening for invasive species
    d. Introduce and enforce invasive species control measures on inter-island shipping
    e. Establish a base of which invasive species indicators are to be collected at the state level
    f. Prioritize lists of invasive species threats to Yap and develop a program to address them
    g. Implement a program to control and/or eradicate Yap's two worst invasive species and to monitor results via a geographic information system (GIS) and public participation
    h. Organize an invasive species 'swat team' for emergency response
    i. Develop a strategy for combating an explosion of invasive vines following natural disasters
    j. Conduct surveys of invasive species, as well as other pests and diseases
    k. Facilitate funding for the Invasive Species Coordinator to participate in cross-agency and international invasive species, pest and disease networks
    l. Request assistance from The Pacific Community (SPC) to enable the continuation of a neutering and spaying program to manage the population of cats and dogs
2. Unsustainable Exploitation of Natural Resources (RD, HPO, EPA, COM-Land Grant):
    a. Continue to evaluate sustainability before natural resources are commercialized or exported
    b. Implement the ban on commercial export of in-shore/near-shore marine resources called for by the First Yap State Economic and Social Summit (1996)
    c. Develop other alternatives to ensure old posts and downed trees are salvaged, to prevent unnecessary cutting of limited large living trees
    d. Establish a body to monitor and prevent illegal harvesting, hunting, selling, buying or exporting of natural resources
    e. Establish and implement a system requiring permits for all research in Yap (not just anthropological research)
    f. Collect data regarding sustainability of timber harvesting
    g. Communicate status of natural resources to communities to ensure their sustainable use at least twice a year

   h. Develop a state seed bank
   i. Document all varieties of agricultural crops such as yam, bananas etc. to help ensure continuation of local agrobiodiversity and agricultural practices
3. Wildfires (DAF, YINS, Fire Section, DPWT, DCO):
   a. Further develop a wildfire plan and ensure community wildfire prevention plans are followed
   b. Continue conducting the wildfire public awareness program featuring "Smokey Fruit Bat" and "Ngobchey Smokey Bear"
   c. Conduct regular Incident Command System (ICS) training to ensure preparedness to address emergencies such as large wildfires, oil spills, and typhoons
4. Climate Change (DCO/RD):
   a. Ensure coastal road building and related development consider the interface of saltwater and freshwater with proper eco-engineering so that changes of waterflow detrimental to crops are avoided
   b. Identify approaches to species and ecosystem preservation in those areas being settled by new communities, ensuring comprehensive community planning is undertaken

Indicators

Development of baseline indicators related to invasive species, along with memoranda of understanding between those parties involved in prevention and control will be important indicators under this objective. The creation of a body to prevent unsustainable harvesting of trees will also be a key indicator, along with the mainstreaming of climate change into development and community planning.

Constraints

The main constraints under this comprehensive objective will relate to funding, understanding and appreciation of sustainable limits to exploitation, and human capacity including conservation officers. The ability of different agencies and organizations to share information and coordinate activities may also be a constraining factor.

Objective 5

Managing Pollution

The actions included in the initial Yap BSAP were as follows:

- Existing earthmoving regulations will be enforced and adherence assured through the Coordinated Project Review Process (CPRP)
- A project will be undertaken to map all known sites of large earthmoving activities, including dredging activities and incorporation of this information into a GIS database, along with surveys of ongoing and past dredge sites, to consider the impact of these operations as well as impacts from altering river and other natural flow patterns on the watershed and surrounding marine areas
- The results of these surveys will be shared with the public
- Alternatives to dredging will be investigated
- A storm water management system will be developed
- A program to provide designs and recommend standard materials for roof catchment systems will be developed. It will mitigate erosion and siltation as well as the need to import drinking water after natural disasters such as Typhoon Sudal

Progress to date

Progress under this objective has been limited, with much of the work related to managing pollution the responsibility of the Environmental Protection Agency (EPA). A Coordinated Project Review Process has not been established, but the EPA do review projects and enforce earthmoving regulations.

No comprehensive mapping of earthmoving and dredging activities has been completed, though again, the EPA maintains records of these activities. The EPA worked with the United States Fish and Wildlife Service to examine preferred sites for dredging, but alternatives to dredging were not explored.

A storm water management system has not yet been developed, and while no overall guidance for roof catchment systems has been developed, water projects with related roof catchment specifications have been completed.

Updated actions:

1. Strengthen enforcement of earthmoving regulations by the Environmental Protection Agency
2. Map earthmoving and dredging activities, incorporating this information into a geographic information system (GIS) database
3. Investigate alternatives to dredging
4. Develop and implement a storm water management system, informed by those developed in other countries, e.g. Palau
5. Develop and implement household water catchment systems based upon successful project experiences
6. Establish and implement wastewater (sewage, laundry etc.) management regulations
7. Enhance solid waste management regulations
8. Conduct public awareness programs regarding the prevention and management of pollution in Yap at least twice a year
9. Assess, implement, and promote alternatives to Styrofoam importation and use in Yap

Indicators

Key indicators under this objective will be improved pollution awareness by the public, the number of households utilizing newly developed water catchment systems, and the development and enforcement of relevant regulations.

Constraints

The main constraints are currently a lack of coordination between the relevant agencies involved in these actions, a general lack of pollution awareness amongst the public, and a lack of involvement from traditional councils. Addressing these constraints will be important in the achievement of the actions under this objective.

Objective 6

Environmental Awareness, Research and Capacity Building

The actions included in the initial Yap BSAP were as follows:

- Informing the Public:
  - Information will be provided to the Public in a timely manner on such topics such as: The potential and danger of the introduction of brown tree snakes from Guam, upcoming drought and fire hazards, the importance of sea turtles, manta rays and other life, the threat of invasive species such as the "mile a minute vine," threats to coral reefs from over fishing, chemicals, oil, erosion and siltation and through special campaigns
  - Phase II of the RARE campaign to build Public understanding of the balance between population and resources will be implemented as planned by MRMD
  - Public information will be provided on the Marine Resources and Coastal Management Program when it is completed and ready for implementation
  - Similar awareness raising programs will be conducted on the completion of other stewardship plans and programs
- Formal Education:
  - Environmental subjects will be included in the head start and elementary curricula
  - At the secondary level students will be introduced to the YBSAP and biodiversity subjects will be linked with sustainable development
- Community Awareness:
  - A Natural Resource Stewardship Council (NRSC) consisting of community representatives appointed by the Councils of Pilung and Tamol (COP & COT) will be created and made part of the ESC
  - Members will be provided with information on community project opportunities, opportunities for on-the-job learning, apprenticeships, study tours and other training to enable them to work with their peers and to provide advice to their respective communities
- Learning from Research:
  - Yap State will define research needs and integrate these with the coordinated project review process
  - In order to enable researchers utilizing Yap for their field studies to contribute to ecologically sustainable development, a biodiversity research permit and tracking system will be established and made part of the Coordinated Project Review Process
  - A system for providing opportunities for members of the NRSC and other Yapese citizens to be employed as apprentices and associates to visiting scientists will be developed in order to help develop local capacity and inform Yap's Public of the nature of research and its relevance to life on Yap
- Development of Local Capacity:
  - Students interested in natural resource fields will be identified and assisted in obtaining scholarships, tracked, provided opportunities for internships on Yap during their studies, and assisted in finding employment upon completion of their education
  - There will be an ongoing program of on-the-job training for those involved in natural resource management

Progress to date

Progress under this objective has been limited. Various public awareness campaigns have been carried out over time (Falanruw, 1979, 1980–2014, 2004 & 2005; Falanruw & Chieng, 2005), with the possibility of future warnings regarding potential droughts likely to be increasingly accurate as they become more predictable in relation to El Niño events. Little has been done to increase awareness of the link between population and natural resources, although a cycle of environmental events has been undertaken focusing on different issues and aspects of the Yap environment. There is a communication plan in place related to the Micronesia Challenge based upon this cycle of events.

Inclusion of environmental subjects in elementary school curricula is lacking, though at the high school level there are programs in place both in Yap High School and Yap Catholic High School.

In terms of developing local capacity for the future, the Japan Association for Promotion of International Cooperation, Bill Raynor and Sophia University scholarship program enables a small number of undergraduate and graduate students from across the FSM to study in Tokyo, Japan. The intention of this program is that the scholarship students will return to the FSM to work in an appropriate environmental capacity. The Micronesia Challenge Young Champions (MCYC) program is also available to young people in Yap. Under the MCYC Internship Program, interns have been recruited across the FSM (and the region) and mentored by resource management agencies across the region. Leadership skills development relevant to environmental management for potential conservation leaders

facilitated through the MCYC Internship Program influences the choice of field of study and future career paths of the interns. The US Forest Service Professional Internships in Pacific [Terrestrial] Island Ecosystem Management (PIPTIEM) program is also available, with natural resources managers able to either attend school or targeted technical trainings while working in their states.

Updated actions:

1. Informing the Public (DOE/DYCA):
    a. Implement timely (at least twice a year) public awareness campaigns on relevant matters, such as invasive species, natural disasters, pollution, and the importance of Yap's biodiversity
    b. Implement phase II of the RARE campaign to build Public understanding of the balance between population and resources
    c. Provide information on the Marine Resources and Coastal Management Program, and other stewardship plans and programs as they are completed
    d. Establish a calendar of environmental events to be rolled out on an annual basis
2. Formal Education (DOE/RD):
    a. Compile and/or develop Yap-focused environmental units to support teaching of all age groups
    b. Introduce secondary level students to the Yap BSAP, and link biodiversity with sustainable development
    c. Increase information flow to communities, addressing gaps in understanding between communities and high-level discussion and decisions, including establishing a process for regular communication with the Councils of Pilung and Tamol
3. Community Awareness COT/COP/YapCAP:
    a. Establish a Natural Resource Stewardship Council (NRSC) consisting of community representatives appointed by the Councils of Pilung and Tamol to be a part of the Environmental Stewardship Consortium
    b. Provide members of the NRSC regularly with information on community project opportunities, opportunities for on-the-job learning, apprenticeships, study tours and other training to enable them to work with their peers and to provide advice to their respective communities
    c. Utilize the existing government news brief service and website to disseminate environmental news and information)
4. Learning from Research:
    a. Define research needs and integrate these under a Coordinated Project Review Process
    b. Establish a biodiversity research permit and tracking system and make part of the Coordinated Project Review Process, in order to enable researchers utilizing Yap for their field studies to contribute to ecologically sustainable development
    c. Develop and implement a system for providing opportunities for members of the NRSC and other Yapese citizens to be employed as apprentices and associates to visiting scientists, to help develop local capacity and inform the public of the nature of ongoing research and its relevance to life on Yap
5. Development of Local Capacity:
    a. Identify students interested in natural resource fields and assist them where possible in obtaining scholarships, track their progress and provide opportunities for internships on Yap during their studies, and assist them in finding employment upon completion of their education
    b. Establish a program of on-the-job training for those involved in natural resource management
    c. Increase the number of professional natural resource stewards (also under Objective 7)

Indicators

Major indicators will include, but not be limited to, conducting engagement and outreach at least twice a year with vibrant community involvement in natural resource management and conservation, the teaching of environmental programs within schools and an ongoing calendar of environmental events. As well as the number of students completing programs such as the USFS PIPTIEM program, the Japan Association for Promotion of International Cooperation, Bill Raynor and Sophia University scholarship and the Micronesia Challenge Young Champions program.

Constraints

Key constrains under this objective will be the political will to enable the development and integration of new environmental groups and coordinating bodies, the need for strong leadership within the non-governmental organization community, and the opportunities that can be offered on-island to help retain people with increasing expertise and skills developed through the described programs and activities.

Objective 7

Stewardship Programs and Environmentally Sustainable Industries

The actions included in the initial Yap BSAP were as follows:

- Marine Stewardship:
  - The Marine Resources and Coastal Management Plan (MRCMP) developed in 1994 and updated through the RARE program in 1999 will be completed and implementation begun within the period of this first YBSAP, and the second phase of the RARE program extended to neighboring islands by MRMD
  - Programs that regulate fishing seasons, designate fishing zones and protected areas, especially to protect routes of spawning aggregations and sites of spawning, to set species specific lower and upper size restrictions and to minimize the use of small nets, will be established
  - Catch and export data needs to be collected and legislation passed to control the export of in-shore and near-shore marine resources
  - The precautionary approach, in which a commercial industry is not initiated until it has been shown to be sustainable, will be taken in the development of marine resource industries
- The Yap International Waters Program (IWP):
  - The FSM pilot IWP project on Yap will identify and address root causes of the degradation of marine resources in coastal waters in 4 community-managed marine protected areas (MPAs)
  - Since this is a pilot project, the lessons learned from Yap's IWP project, and from IWP projects undertaken elsewhere will be used to develop larger projects in improved integrated coastal management
- Land Stewardship Program (LSP):
  - The connectivity of land and marine areas will be incorporated into stewardship programs
  - Because most land in Yap is privately owned, this program will be implemented though the development of sustainable land stewardship guidelines which may be used by individuals and communities in managing their resources
  - The land resource stewardship program will define the best uses for different categories of land on Yap and establish a program to assist land owners to utilize their lands in the best way. Support would not be given for projects that use land resources in unsustainable ways
  - Earthmoving regulations will be adhered to and projects would go through the Coordinated Project Review Process (CPRP)
  - Yap's watersheds will be mapped and their boundaries incorporated into a GIS system
  - Guidelines will be developed for good stewardship of watersheds and Public awareness programs will enable individuals to understand the relationship of their actions to the surrounding watershed from land to sea
  - Locally relevant guidelines for agriculture, agroforestry, recommended species for planting, including fruit tree species; tree planting and management of native forests will be developed and provided for the use of individuals and communities. These guidelines along with resource maps from the GIS system will be available to assist communities in developing village and municipal plans
  - The completion of such plans will make villages and communities eligible for assistance in carrying out their plans
- Critical Areas for Protection:
  - In order to protect the uniqueness, integrity and functioning of Yap's ecosystem; species, communities, processes and systems that are unique or critical will be defined and protected
  - Special efforts will be made to protect relatively intact natural systems that connect a series of natural communities from ridge to reef
  - A variety of management techniques will be employed to maintain the integrity of these systems, including protected areas, enhanced traditional practices and alternative uses of natural areas (for example, some resources may be more valuable as tourist attractions than as resources to be exploited for export)
  - At least one terrestrial ABS and 4 marine ABS will be surveyed and have stewardship plans developed within the first 5 years of this YBSAP
- Stewardship Programs and Environmentally Sustainable Industries:
  - A technical assistance and incentive program will be developed to assist individuals, groups, and communities to undertake projects that simultaneously improve living conditions for people and other biodiversity

Progress to date

Good progress has been made in achieving a number of the actions under this objective. In terms of marine stewardship, whilst the Marine Resources and Coastal Management Plan remains in draft form, a number of marine protected areas have been established and

certified. The Yap Protected Area Network regulations are also in development. In addition, there are regulations around the harvesting of turtle, giant clam, trochus and coconut crab. There are recognized gaps in the marine policy landscape with regard to the catching of live reef fish and the targeting of spawning aggregations.

With regard to the Yap International Waters Program, the Riken Marine Protected Area has been established under this. The Ridge to Reef program is addressing the need to link land management with marine stewardship. The watersheds of Yap have been mapped and incorporated into a geographic information system (GIS), with data on vegetation, soils, elevation above sea level and vulnerability to sea level rise and locations of areas of special biodiversity significance, etc., and guidelines for watershed stewardship are currently in draft form. Taro patches and sites of intermittent gardens have been mapped and related to elevation above sea level. Data on each of Yap's watersheds and interfluve areas has been tabulated and is available to communities for the preparation of data-based proposals (Ruegorong et al, 2016). Projects are underway with The Pacific Community (SPC) to identify salt-resistant crops. Government and donors together have funded concrete taro patch projects in some outer island communities.

Areas of Biological Significance (ABSs) have been identified, with terrestrial and marine protected areas, along with work under the Ridge to Reef program, combining to protect important habitats and ecosystems. Surveying of the ABSs has been completed. Different management methods, including traditional techniques are utilized across the various protected areas.

While a state-level stewardship program is still needed, a variety of activities, including alternative livelihoods projects and the various types of protected areas, help to support individuals and communities to utilize biodiversity sustainably and improve living conditions.

Updated actions:

1. Marine Stewardship: (RD, YapCAP, YFA)
    a. Complete and implement the Marine Resources and Coastal Management Plan (MRCMP), and implement the second phase of the RARE program to neighboring islands (1st Year)
    b. Establish and implement programs that regulate fishing seasons, designate fishing zones and protected areas, especially to protect routes of spawning aggregations and sites of spawning, set species specific lower and upper size restrictions and minimize the use of small nets
    c. Collect catch and export data with relevant legislation passed to control the export of in-shore and near-shore marine resources
    d. Assess institutional arrangements around monitoring and enforcement of regulations, and instigate changes where needed to allow the deputization of enforcement to appropriate individuals and organizations
    e. Assess all new commercial industry ventures to ensure it is sustainable and viable, utilizing the precautionary approach. Follow the precautionary approach, in which a commercial industry is not initiated until it has been shown to be sustainable, in the development of marine resource industries
2. The Yap International Waters Program (IWP): (RD)
    a. Further develop the pilot IWP project on Yap to identify and address root causes of the degradation of marine resources in coastal waters to encompass four community-managed marine protected areas
3. Land Stewardship Program (LSP): (RD, EPA)
    a. Incorporate the connectivity of land and marine areas into stewardship programs
    b. Develop sustainable land stewardship guidelines to be used by individuals and communities in managing their resources
    c. Define the best uses for different categories of land on Yap and establish a program to assist land owners to utilize their lands in the best way. Support will not be given for projects that use land resources in unsustainable ways
    d. Develop and implement terrestrial management area regulations
    e. Ensure earthmoving regulations are adhered to and projects are assessed under the Coordinated Project Review Process (CPRP)
    f. Develop and implement guidelines for the good stewardship of watersheds, with public awareness programs utilized to enable individuals to understand the impact of their actions on the surrounding watershed from land to sea
    g. Develop locally relevant guidelines for agriculture, agroforestry, recommended species for planting, including fruit tree species, tree farming and management of native forests, and provide these to individuals and communities to assist in the development of village and municipal plans
    h. Identify sources of technical expertise to support the maintenance of the geographic information system (GIS)
4. Critical Areas for Protection:
    a. Define and protect species, communities, processes and systems that are unique to Yap or critical to the functioning of Yap's ecosystems
    b. Protect relatively intact natural systems that connect a series of natural communities from ridge to reef

c. Employ a variety of management techniques to maintain the integrity of these systems, including protected areas, enhanced traditional practices and alternative uses of natural areas
d. Continue to survey terrestrial and marine Areas of Biological Significance (ABSs), and develop stewardship plans for these
e. Increase the number of professional natural resource stewards (also under Objective 6)

5. Stewardship Programs and Environmentally Sustainable Industries:
a. Develop a technical assistance and incentive program to assist individuals, groups, and communities to undertake projects that simultaneously improve living conditions for people and other biodiversity
b. Assess feasibility of utilizing water funds as a possible source of income generation for sustainable water management
c. Investigate prospects and qualifications for earning carbon credits and carbon marketing to support forest conservation, especially for mangroves

Indicators

Key indicators under this objective will be the establishment of further protected areas, as well as the implementation of associated management plans and regulations that have been developed with and for the affected local communities.

Constraints

The main constraints under this objective are likely to be a lack of funding, and the degree of networking and collaboration that can be achieved between the necessary parties to ensure actions such as the implementation of protected area management plans can be successfully addressed.

Implementation, Monitoring and Reporting

Implementation

Implementation of this Yap BSAP will require a broad network of government agencies, funding bodies, civil-society groups and communities. This will require coordination through the government to ensure necessary funds can be accessed and the appropriate groups collaborate as needed, and will also require strong involvement from the Protected Area Network Coordinator.

It is expected that, unless otherwise defined, implementation across all actions will take place within the 5-year timeframe of this BSAP.

Monitoring, Reporting and Reviewing

The Yap BSAP is a 5-year plan and after 5 years the lead agencies and partners will have a meeting to review and discuss what activities have been successful or not, reasons why, how to improve such activities that have not been successful, and finally to continue work on those activities that have not been fully established

Monitoring the implementation of the Yap BSAP will be undertaken in two ways. The lead agencies and parties will be requested to complete an annual quick assessment, using the assessment form provided in Appendix 1. This process will involve identifying which actions have been completed or achieved, which actions some progress has been made on, and which require initiating. This process will also enable the identification of necessary additional actions under each Objective. This quick assessment process will be led and managed by national and state governments together, and facilitated by the Micronesia Conservation Trust.

A full review and revision of the Yap BSAP will be undertaken after five years, in 2023. This will follow a similar process of consultations and validation that have been utilised in the current revision. This review will provide an opportunity for major progress, changes or developments to be recorded and considered for inclusion in the next revision of the Yap BSAP, and will ensure that all Objectives and Actions remain relevant and reflect the challenges and unmet needs of Yap's biodiversity at that time. This will also provide an opportunity to ensure that Yap BSAP supports the planned revision of the NBSAP and that both remain in line with any new strategies of initiatives under the Convention for Biological Diversity.

Reporting and disseminating information regarding the Yap BSAP and its constituent programs is the responsibility of the state government.

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Appendix 1: Annual Quick Assessment Template

The following templates will be completed on an annual basis as an overview assessment of progress on the Yap BSAP.

Objective 1:

Objective:	Degree of achievement			Still relevant?
	No progress	Some progress	Completed	
Institutional Arrangements				
Actions:				
1. Identify an appropriate champion to reinvigorate the Environmental Stewardship Consortium as a body to bring together all agencies and groups undertaking biodiversity-related programs and activities, or establish a Yap-wide environmental non-governmental organization as an appropriate alternative (1st Year – YapCAP and RD)				
2. Set up an online platform for information sharing between participants in the Environmental Stewardship Consortium (or alternative body) and with appropriate agencies and organizations (1st Year)				
3. Appoint a contractor to develop indicators of sustainable development (1st Year – RD, EPA)				
4. Train local personnel to coordinate with current geographic information system (GIS) staff and to act as a coordinator for activities under the Convention for Biological Diversity and the Micronesia Challenge (1st Year – Division of Land Resources)				
5. Develop and coordinate a program of sustainable development (Year 2 - RD, EPA)				
6. Appoint a champion who will define the roles and responsibilities of all government agencies, non-governmental organizations and community-based organizations whose work relates to biodiversity, and who will identify where work is being duplicated and can be made more efficient (Year 1, Governor's Office)				
7. Increase consultations with traditional leaders to at least twice a year (Year 1, at least twice a year – Lead for ESC)				
8. Establish a Coordinated Project Review Process (CPRP) via Executive Order or Resolution to provide a clear and orderly process for community involvement and environmental review of proposed projects including bioprospecting, research projects, foreign investment and long-term leases, and proposals for unsustainable fishing ventures such as the Live Reef Food Fish Trade (LRFFT) that targets spawning aggregations of fish (Year 1, Governor's Office supported by RD and EPA)				
Additional actions and/or comments:				

Objective 2:

Objective:	Degree of achievement			Still relevant?
	No progress	Some progress	Completed	
Secure and Enhance Traditional Knowledge				
Actions:				
1. Continue to document traditional use of the land and sea on Yap to provide context for local projects as appropriate to individuals, families and communities (Every year, maintained; YapCAP and HPO)				
2. Document and evaluate traditional ways to manage erosion and sedimentation, and evaluate ways of integrating traditional controls on resource exploitation with modern management practices (Every year with action item list developed, subsequently implemented and maintained)				
3. Link projects results with scientific principles where appropriate, so that they may be further enhanced to provide viable and locally relevant alternatives for the future (Every year, maintained; Yap and HPO utilizing the platform identified and established under 'Institutional Arrangements')				
4. Support additional personnel to aid in the collecting and documenting of traditional knowledge and arts, and support expert traditional practitioners so that they may continue to practice and pass on their knowledge and skills with that knowledge held by elders a priority (Year 1)				
Additional actions and/or comments:				

Objective 3:

Objective:	Degree of achievement			
	No progress	Some progress	Completed	Still relevant?
Inventory and Monitoring				
Actions:				
1. Recruit a Protected Area Network Coordinator (Year 1, DRD)				
2. Continue to certify new marine protected areas (Year 2, DRD)				
3. Demarcate terrestrial protected areas appropriately (Year 2, DAF)				
4. Continue regular surveying and mapping of terrestrial and marine communities and protected areas (Every year, MRMD, YapCAP, and DAF)				
5. Develop maps of current patterns within Yap's lagoon, and develop indicators for influence of land run-off				
6. Comprehensively inventory species within natural communities and incorporate species information into a geographic information system (GIS) (1st Year, utilize SEA through R2R and Champion)				
7. Update maps with regard to species incidence (3rd Year)				
8. Analyse data to identify trends and/or patterns (2nd Year)				
9. Establish and maintain a Yap State biodiversity database (2nd Year)				
10. Develop an official list of rare species and share with leadership and communities for action (5th Year)				
Additional actions and/or comments:				

Objective 4:

Objective:	Degree of achievement			Still relevant?
	No progress	Some progress	Completed	
Biosecurity – Addressing invasive species and other threats to biodiversity				
Actions:				
1. Invasive species awareness program (DAF):				
a. Utilize the Yap Invasive Species Taskforce as main entity supporting invasive species management				
b. Conduct a public awareness program to acquaint people with invasive species and their dangers				
c. Work with quarantine offices in Palau and Guam to develop effective prevention of invasive species entering Yap, e.g. pre-screening for invasive species				
d. Introduce and enforce invasive species control measures on inter-island shipping				
e. Establish a base of which invasive species indicators are to be collected at the state level				
f. Prioritize lists of invasive species threats to Yap and develop a program to address them				
g. Implement a program to control and/or eradicate Yap's two worst invasive species and to monitor results via a geographic information system (GIS) and public participation				
h. Organize an invasive species 'swat team' for emergency response				
i. Develop a strategy for combating an explosion of invasive vines following natural disasters				
j. Conduct surveys of invasive species, as well as other pests and diseases				
k. Facilitate funding for the Invasive Species Coordinator to participate in cross-agency and international invasive species, pest and disease networks				
l. Request assistance from The Pacific Community (SPC) to enable the continuation of a neutering and spaying program to manage the population of cats and dogs				
2. Unsustainable Exploitation of Natural Resources (RD, HPO, EPA, COM-Land Grant):				
a. Continue to evaluate sustainability before natural resources are commercialized or exported				
b. Implement the ban on commercial export of in-shore/near-shore marine resources called for by the First Yap State Economic and Social Summit (1996)				
c. Develop other alternatives to ensure old posts and downed trees are salvaged, to prevent unnecessary cutting of limited large living trees				
d. Establish a body to monitor and prevent illegal harvesting, hunting, selling, buying or exporting of natural resources				

e. Establish and implement a system requiring permits for all research in Yap (not just anthropological research)				
f. Collect data regarding sustainability of timber harvesting				
g. Communicate status of natural resources to communities to ensure their sustainable use at least twice a year				
h. Develop a state seed bank				
i. Document all varieties of agricultural crops such as yam, bananas etc. to help ensure continuation of local agrobiodiversity and agricultural practices				
3. Wildfires (DAF, YINS, Fire Section, DPWT, DCO):				
a. Further develop a wildfire plan and ensure community wildfire prevention plans are followed				
b. Continue conducting the wildfire public awareness program featuring "Smokey Fruit Bat" and "Ngobchey Smokey Bear"				
c. Conduct regular Incident Command System (ICS) training to ensure preparedness to address emergencies such as large wildfires, oil spills, and typhoons				
4. Climate Change (DCO/RD):				
a. Ensure coastal road building and related development consider the interface of saltwater and freshwater with proper eco-engineering so that changes of waterflow detrimental to crops are avoided				
b. Identify approaches to species and ecosystem preservation in those areas being settled by new communities, ensuring comprehensive community planning is undertaken				
Additional actions and/or comments:				

Objective 5:

Objective:	Degree of achievement			Still relevant?
	No progress	Some progress	Completed	
Managing Pollution				
Actions:				
1. Strengthen enforcement of earthmoving regulations by the Environmental Protection Agency				
2. Map earthmoving and dredging activities, incorporating this information into a geographic information system (GIS) database				
3. Investigate alternatives to dredging				
4. Develop and implement a storm water management system, informed by those developed in other countries, e.g. Palau				
5. Develop and implement household water catchment systems based upon successful project experiences				
6. Establish and implement wastewater (sewage, laundry etc.) management regulations				
7. Enhance solid waste management regulations				
8. Conduct public awareness programs regarding the prevention and management of pollution in Yap at least twice a year				
9. Assess, implement, and promote alternatives to Styrofoam importation and use in Yap				
Additional actions and/or comments:				

Objective 6:

Objective:	Degree of achievement			Still relevant?
	No progress	Some progress	Completed	
Environmental Awareness, Research and Capacity Building				
Actions:				
1. Informing the Public (DOE/DYCA):				
a. Implement timely (at least twice a year) public awareness campaigns on relevant matters, such as invasive species, natural disasters, pollution, and the importance of Yap's biodiversity				
b. Implement phase II of the RARE campaign to build Public understanding of the balance between population and resources				
c. Provide information on the Marine Resources and Coastal Management Program, and other stewardship plans and programs as they are completed				
d. Establish a calendar of environmental events to be rolled out on an annual basis				
2. Formal Education (DOE/RD):				
a. Compile and/or develop Yap-focused environmental units to support teaching of all age groups				
b. Introduce secondary level students to the Yap BSAP, and link biodiversity with sustainable development				
c. Increase information flow to communities, addressing gaps in understanding between communities and high-level discussion and decisions, including establishing a process for regular communication with the Councils of Pilung and Tamol				
3. Community Awareness COT/COP/YapCAP:				
a. Establish a Natural Resource Stewardship Council (NRSC) consisting of community representatives appointed by the Councils of Pilung and Tamol to be a part of the Environmental Stewardship Consortium				
b. Provide members of the NRSC regularly with information on community project opportunities, opportunities for on-the-job learning, apprenticeships, study tours and other training to enable them to work with their peers and to provide advice to their respective communities				
c. Utilize the existing government news brief service and website to disseminate environmental news and information)				
4. Learning from Research:				
1. Define research needs and integrate these under a Coordinated Project Review Process				
2. Establish a biodiversity research permit and tracking system and make part of the Coordinated Project Review Process, in order to enable researchers utilizing Yap for their field studies to contribute to ecologically sustainable development				
3. Develop and implement a system for providing opportunities for members of the NRSC and other Yapese citizens to be employed as apprentices and associates to visiting scientists, to help develop local capacity and inform the public of the nature of ongoing research and its relevance to life on Yap				

5. Development of Local Capacity:				
a. Identify students interested in natural resource fields and assist them where possible in obtaining scholarships, track their progress and provide opportunities for internships on Yap during their studies, and assist them in finding employment upon completion of their education				
b. Establish a program of on-the-job training for those involved in natural resource management				
c. Increase the number of professional natural resource stewards (also under Objective 7)				
d. Identify students interested in natural resource fields and assist them where possible in obtaining scholarships, track their progress and provide opportunities for internships on Yap during their studies, and assist them in finding employment upon completion of their education				
Additional actions and/or comments:				

Objective 7:

Objective:	Degree of achievement			Still relevant?
	No progress	Some progress	Completed	
Stewardship Programs and Environmentally Sustainable Industries				
Actions:				
1. Marine Stewardship: (RD, YapCAP, YFA)				
a. Complete and implement the Marine Resources and Coastal Management Plan (MRCMP), and implement the second phase of the RARE program to neighboring islands (1st Year)				
b. Establish and implement programs that regulate fishing seasons, designate fishing zones and protected areas, especially to protect routes of spawning aggregations and sites of spawning, set species specific lower and upper size restrictions and minimize the use of small nets				
c. Collect catch and export data with relevant legislation passed to control the export of in-shore and near-shore marine resources				
d. Assess institutional arrangements around monitoring and enforcement of regulations, and instigate changes where needed to allow the deputization of enforcement to appropriate individuals and organizations				
e. Assess all new commercial industry ventures to ensure it is sustainable and viable, utilizing the precautionary approach. Follow the precautionary approach, in which a commercial industry is not initiated until it has been shown to be sustainable, in the development of marine resource industries				
2. The Yap International Waters Program (IWP): (RD)				
a. Further develop the pilot IWP project on Yap to identify and address root causes of the degradation of marine resources in coastal waters to encompass four community-managed marine protected areas				
3. Land Stewardship Program (LSP): (RD, EPA)				
a. Incorporate the connectivity of land and marine areas into stewardship programs				
b. Develop sustainable land stewardship guidelines to be used by individuals and communities in managing their resources				
c. Define the best uses for different categories of land on Yap and establish a program to assist land owners to utilize their lands in the best way. Support will not be given for projects that use land resources in unsustainable ways				
d. Develop and implement terrestrial management area regulations				
e. Ensure earthmoving regulations are adhered to and projects are assessed under the Coordinated Project Review Process (CPRP)				
f. Develop and implement guidelines for the good stewardship of watersheds, with public awareness programs utilized to enable individuals to understand the impact of their actions on the surrounding watershed from land to sea				
g. Develop locally relevant guidelines for agriculture, agroforestry, recommended species for planting, including fruit tree species, tree farming and management of native forests, and provide these to individuals and communities to assist in the development of village and municipal plans				
h. Identify sources of technical expertise to support the maintenance of the geographic information system (GIS)				

4. Critical Areas for Protection:				
a. Define and protect species, communities, processes and systems that are unique to Yap or critical to the functioning of Yap's ecosystems				
b. Protect relatively intact natural systems that connect a series of natural communities from ridge to reef				
c. Employ a variety of management techniques to maintain the integrity of these systems, including protected areas, enhanced traditional practices and alternative uses of natural areas				
d. Continue to survey terrestrial and marine Areas of Biological Significance (ABSs), and develop stewardship plans for these				
e. Increase the number of professional natural resource stewards (also under Objective 6)				
5. Stewardship Programs and Environmentally Sustainable Industries:				
a. Develop a technical assistance and incentive program to assist individuals, groups, and communities to undertake projects that simultaneously improve living conditions for people and other biodiversity				
b. Assess feasibility of utilizing water funds as a possible source of income generation for sustainable water management				
c. Investigate prospects and qualifications for earning carbon credits and carbon marketing to support forest conservation, especially for mangroves				
Additional actions and/or comments:				