Literature & case study review on protected areas and conservation schemes outcomes

Case studies

This document presents the full case studies received to inform section 4.5.2 in the IPBES values assessment, on protected areas.

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Protected Area Case Study: Nanda Devi Biosphere Reserve

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1. Case study context

1.1. Biophysical conditions

Located within the Indian state of Uttarakhand, Nanda Devi Biosphere Reserve (NDBR) encompasses 5860.69km^2, of which 624.62km^2 comprises the uninhabited core zone, Nanda Devi National Park (NDNP). The smaller Valley of Flowers National Park (87.50km^2) is a second core zone within NDBR. The remaining area forms a sparsely inhabited buffer zone which occupies the entire Rishi Ganga catchment. The NDNP is girdled by a dozen peaks exceeding 6400m. The tallest, Nanda Devi (7817m), is India's second-highest mountain. This 'closed' geomorphological profile, and wide altitudinal zonation (1800m-7817m) the facilitates rich biodiversity recorded within the reserve (Silori, 2007; Singh & Singh, 2004); the trans-Himalayan topography fosters both the influx of taxa, and their geographical isolation, promoting endemism (Maikhuri et al. 2000).

Alpine meadows and forest comprise 27% of NDBR, whilst 66% lies under perpetual snow cover (Silori, 2007). NDBR is highly floristically diverse, containing 793 recorded plant species, with many holding medicinal and ethnobotanical importance (Silori, 2007; Rawat & Joshi, 2014). 17 mammal species, 112 bird species and 27 butterfly species have been identified (Silori, 2007). Moreover, numerous IUCN Red List taxa are present: snow leopard (*Panthera uncia*), Himalayan black bear (*Selenarctos thibetanus*), Himalayan brown bear (*Ursus arctos*), blue sheep (*Pseudos nayaur*), Himalayan musk deer (*Moschus chrysogaster*) and others (Silori, 2007). The area is biophysically vulnerable. The core zone experienced significant degradation from mountain tourism (banned 1982): suffering large-scale deforestation, fires, and pollution. Commercial logging permits were granted to outside contractors until 1988 (Maikhuri et al., 2000). Some recovery has been witnessed since, but the area remains vulnerable to anthropogenic and climatic pressures (Ogra & Badola, 2015).

1.2. Socio-economic conditions

The NDBR buffer zone incorporates 47 villages, comprising <1% of total buffer zone area (Maikhuri et al., 2005). The human population is dominated by the indigenous *Bhotia* community; Khasa and Garwhali ethnic groups are also represented (Nautiyal et al., 2003). Locally, NDBR is considered a sacred landscape within the spiritualities of all ethnic groups; Nanda Devi is revered as a symbol of the goddess Nanda (Kala & Maikhuri, 2011; Singh Rana et al., 2003). The Bhotia practiced cross-border trade with Tibet until the 1962 Indo-China War, a longstanding system which sourced essential goods that were locally unavailable (Saxena et al., 2010). This conflict also curbed access to traditional camping and grazing grounds in Tibet. Many Bhotia communities within NDBR are semi-nomadic and practice transhumance (Tiwari & Joshi, 2009). However, land-use changes associated with NDBR inscription initiated the rapid assimilation of the transhumant population into the sedentary community (Nautiyal et al., 2003). Livestock, principally sheep

and goats, now provides 60–80% of household income (Rao et al., 2000). Marginal agriculture, including newly cultivated cash crops; limited NTFP collection in the buffer zone; and trade in woollen handicrafts, also generate income (Silori, 2007). Since NDBR inscription, the buffer zone population has increased by 37%/decade, intensifying pressure on scarce resources (Nautiyal et al., 2003). The area thus faces an average annual food shortfall of 93%, even as per capita consumption declines (Tiwari & Joshi, 2009).

1.3. History, land tenure and inequities

Whilst >93% of families are landowners, the majority are smallholders practicing marginal agriculture (Silori, 2007). 87% households own <1ha land; only 0.5% families have land holdings exceeding 3ha (Tiwari & Joshi, 2009). Traditionally, each village had common forests and meadows wherein small-scale NTFP harvesting, livestock grazing, and fuel and fodder collection occurred; resource conservation was achieved through social responsibility rather than policy intervention (Saxena et al., 2010). These commons were seized by the colonial Forest Department in 1865. Communities were, however, given rights for the utilization of NTFPs until NDNP was inscribed in 1982. The first formal conservation framework was implemented in 1939, when the site was declared a Wildlife Sanctuary; restriction to land and resource access has increased over the past 70 years (see Figure 1). Two NDBR buffer zone villages, Reni and Lata, are also notable as origins of the 1970s *Chipko* environmentalist movements, though little of the original conservation sentiment presently remains (Mawdsley, 1998) – partly attributed to the exclusionary policies of NDBR (Singh & Singh, 2004).

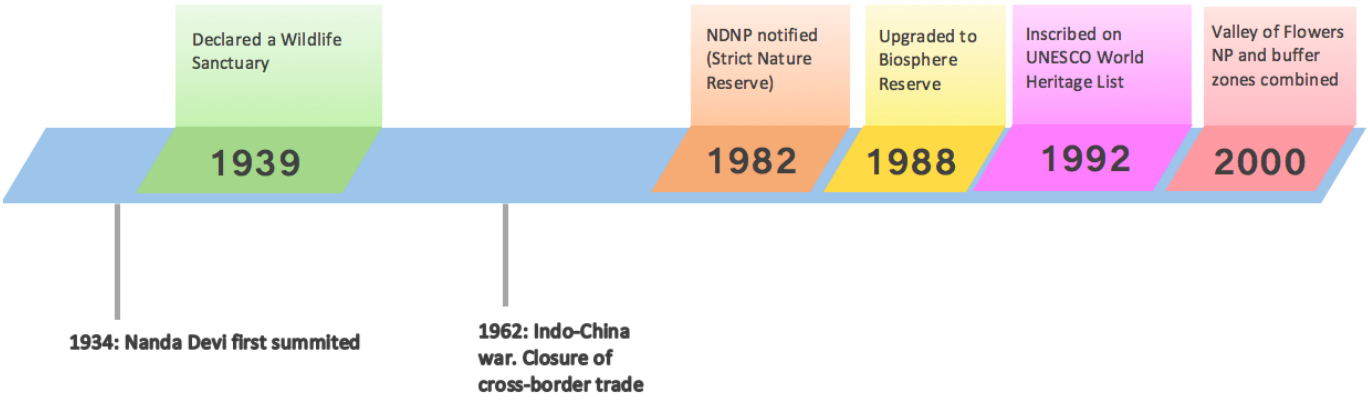

Figure 1. Significant events in NDBR history and governance

1.4. Contemporary governance context and policy

Nanda Devi Biosphere Reserve is a UNESCO Natural World Heritage Site, inscribed in 1992 under criteria vii and x. The larger core zone, NDNP, is off limits for all but patrol staff and researchers, falling under IUCN Category Ia of protection (Strict Nature Reserve) (IUCN, 2005; Maikhuri et al., 2000). The Valley of Flowers National Park, which was incorporated into NDBR in 2000, permits limited ecotourism (>50 visitors/day) (IUCN, 2005). NDNP, however, is premised on the absolute exclusion of locals, curtailing their traditional rights of access to subsistence resources, and essential sources of livelihood. All consumptive

use of forest resources is prohibited (Saxena et al., 2010). For this, residents have rarely been offered consultation or explanation, despite significant losses of income and traditional lifeways (Maikhuri et al., 2000). NDBR is thus a top-down conservation effort that typifies "an unsavoury example of the people-parks relationship" (Singh & Singh, 2004). Well-intentioned conservation measures have gradually undermined the economy, culture and values of communities that have inhabited the landscape for generations (Tiwari & Joshi, 2009; Rao et al., 2000).

2. Protected Area establishment

2.1. Goals of the reserve

NDNP received Biosphere Reserve status in 1988; additional protection goals were ascribed according with Indian legislation for Biosphere Reserves (Table 1). However, few locals were informed of the goals of NDBR in any depth, continuing to date (Rao et al., 2003). NDBR was inscribed under the provisions of the Man and Biosphere (MAB) program, launched by UNESCO in 1970 (Table 1); plans for sustainable livelihood options were contained within the nomination documents. However, most MAB provisions were ineffective under local ecological and sociocultural conditions (Tiwari & Joshi, 2009). Those from which benefits were derived – including the subsidisation of solar power devices, improved beehives, and spinning devices, alongside wages for afforestation – were considered insufficient compensation for the losses wrought by NDBR restrictions (Maikhuri et al., 2000). Indeed, citing NDBR, Seaba (2007) observes that Objective 2 of the MAB programme has been consistently been neglected.

Table 1. Comparison of Indian Government and UNESCO MAB program's objectives (Source: Rao et al., 2003; Seaba, 2007f)

Indian legislation for Biosphere Reserves	UNESCO Man and Biosphere Program
(1) Protection of environment/habitat of specific species	(1) To protect biodiversity through Protected Areas
(2) The promotion of scientific research and environmental education	(2) To facilitate the sustainable co-existence of rural populations and ecosystems
(3) The improvement of the social and economic status of local people to ensure sustainable use of natural resources under traditional patterns of land use.	(3) To provide field sites for researchers

2.2. Restrictions and enforcement

The vast area, dissected terrain, inaccessibility, and limited manpower and finance within NDBR are key obstacles to effective enforcement (Maikhuri et al., 2005; Rao et al., 2003). Yet despite the significant losses of livelihood experienced by communities, widespread violations of management prescriptions – agricultural expansion, illicit grazing, or poaching – were not observed by Maikhuri et al. (2001) during multi-year field research. The authors suggest that, whilst the main source of people-park conflict is often

claims on resources inside Protected Areas, this may be less pertinent to NDBR. Instead, the tourism ban was identified as the main source of resentment, on account of its higher economic value relative to NTFP collection (Maikhuri et al. 2001; Silori, 2007). Until the early 1980s, >90% of men in Reni, Lata, Tolma and Peng villages, located within the NDBR buffer zone, were employed as tour guides (Maikhuri et al., 2000). However, unorganised mountaineering seriously threatened the biological and cultural integrity of the reserve: the need to mitigate the impacts of this industry significantly drove the original inscription of NDNP (Silori, 2007).

2.3. Financial sustainability of the reserve

Enforcement accounts for significant government expenditure on NDBR, which is resented by locals, who previously achieved resource conservation through social responsibility (Saxena et al., 2010). The 1993 Biosphere Management Plan allotted 58% of its budget to reserve staff salaries, compared to 21% for eco-development and 11.8% for research and education – a significant source of tension for local communities that have unanimously suffered livelihood losses after NDBR inscription (Maikhuri et al. 2000). Although expanded ecotourism is planned to compensate for lost livelihoods, difficulties concerning restraining scale, free market forces, and anxieties about cultural integration and erosion have been repeatedly identified for NDBR (Singh & Singh, 2004). Only 40% of residents (n=1503) believed that ecotourism could sufficiently supplement their income (Rao et al., 2003); this would, moreover, disproportionately benefit villages located closer to trek starting points. Collectively, these signal tensions in the long-term financial sustainability of NDBR, potentially jeopardising conservation goals.

3. Values of nature in NDBR

Because the decision-making processes concerning NDBR entailed limited consultation with the local and indigenous community, the reserve has been termed a "striking example" of the failures of top-down conservation initiatives (Tiwari & Joshi, 2009:1; Rao et al., 2000). It was widely felt that the community "[found themselves] the last party to decide our own destinies" (Singh Rana et al., 2003:1). Accordingly, local resistance has urgently sought to restore traditional rights of access to forest resources, and right to earn a livelihood through mountain tourism (Singh & Singh, 2004; Singh Rana et al. 2003).

3.1. Local resistance

Longstanding attempts to organise, and connect with advocacy groups, have characterised the struggle to restore traditional rights since the 1980s (Singh Rana et al., 2003). For instance, the *Vanaadhikar* ('rights to the forest') community group, based in Joshimar, promulgates an ethos of self-help and self-development (Singh & Singh, 2004). Their assertion is that common natural resources should belong to the community; for this reason, their slogan in the face of NDBR restrictions is *Cheeno Jhapto* ('Snap and Snatch') – in kind, recalling the *Jungle Kato* 'cut down the forest' movements that the failures of the *Chipko* movement incited. Moreover, in 1998, women *gheraoed* (besieged) a retinue of field scholars of the Zoological Survey of India, whilst 500 men illegally entered the core zone (Singh & Singh, 2004). Local *Gram Sabhas* (village councils) have also been active in formulating alternative plans for sustainable community management. For instance, the 'Nanda Devi Biodiversity Conservation and Ecotourism

Declaration', formulated September 2001, outlined the foundations for community-based management processes for development. Community workshops, drawing together NGOs, resource institutions, residents, and management officials, have also been important forums (Singh & Singh, 2004). However, Seaba (2007) observes that concessions by park authorities remain limited – prompting the contention that discourses of participation within NBDR are primarily rhetorical.

3.2. Whose values were reflected/excluded?

NDBR currently lacks transparent and inclusive management mechanisms that are capable of incorporating local cultural and moral values (Tiwari & Joshi, 2009). Crucially, this elides a significant resource for effective local conservation. Indeed, Bhotia ideas of resource management are based on ideas of exchange with a sacred landscape – a landscape identified with communal livelihoods and other daily activities. According to Bosak (2008), recognition of these multiple concepts of nature under Bhotia worldviews could help foster conservation policies that can dually preserve biodiversity and empower communities with resource management schemes embedded within local concepts of nature – yet NDBR is managed exclusively with scientific conservation paradigms in mind. Western concepts including "ecosystem services" or "nature-based solutions" rarely resonate with indigenous values of nature, which are seen as reciprocal rather than linear (Swiderska et al., 2020). This is reified by the claims of community leaders in NDBR: that "the chaos and confusion of new terminologies [reduced them] to mere beneficiaries or stakeholders" within management discussions (Singh Rana et al., 2003:1) – upending their longstanding roles as landscape owners and stewards.

Religious and spiritual values

The scientific protection of NDBR biodiversity omits aspects of traditional management systems and local worldviews that could prove amenable to conservation goals. Cultural and spiritual values are often critical for delivering conservation outcomes (Swiderska et al., 2020). Within local spiritualities, Nanda Devi is "a sacred summit… the daughter of the Himalaya and the wife of Shiva". Revered as a sacred site, the mountain "remains aloof and unapproachable" (Singh Rana et al., 2003:1-2). Religious prescriptions dictate that damaging natural resources, including killing wildlife or misusing alpine pastures, will incur physical and financial difficulties to perpetrators. This generally prevents the violation of customary rules of natural resource management (Bisht & Sharma, 2005). Desires to protect the sanctity of the sacred landscape illustrate an instance of value convergence between general conservation and local spiritual goals. This was not recognised when protection criteria were recommended. Indeed, the World Heritage Site is inscribed only under 'Natural' criteria – and not 'Mixed' (Cultural and Natural) as elsewhere in India, such as Khangchendzönga National Park. The latter nomination incorporated the significance of Mount Khangchenjunga as the residence of a local deity (ICOMOS, 2016); this was not afforded to Nanda Devi.

Socioeconomic and sociocultural values

Within the settled community, the multiple values of forest resources within the traditional system were of significant conservation value; the utility of NTFPs to the local economy and culture was identified as a protective force upon forest cover (Saxena et al., 2010). The numerous benefits derived from NTFPs

exceeded short-term gains from the timber trade; thus, the latter was never widespread. Lopping, grazing and NTFP collection were 'group' activities over timeslots fixed by village councils to reduce overexploitation by individuals. Moreover, the traditional system of a single (village-based) forum for all environmental matters may be more effective than the poorly-linked multiple institutions of NDBR (Maikhuri et al., 2000). These assessments contradict the widespread assumptions within conservation-development approaches that consider traditional systems of landscape management both economically and ecologically unsound (Saxena et al., 2010). Moreover, transhumance stipulates the efficient use of seasonally abundant resources in marginal environments without degradation (Nautiyal et al., 2003). These activities necessarily fell within land carrying capacity limits; nomads grazed their livestock on land unused by local livestock, avoiding land-use intensification (Saxena et al., 2010). The exclusion of locals within NDBR further overlooks their positive role in maintaining and enhancing biodiversity through traditional ecological knowledge (TEK) and sustainable lifestyles (Maikhuri et al. 2000).

3.3. Compensation procedures

Buffer zone communities were promised adequate compensation for losses of land and livelihood through a well-designed rehabilitation program of rural development schemes. However, these interventions were postponed since the scientific Park Management Plan was delayed (Singh & Singh, 2004). In particular, the cost of livestock depredation is high: amounting to 731,900 RS in 1991-1996 (Maikhuri et al., 2001). Despite this, many valid compensation claims are not submitted due to prohibitively complex procedures, their long duration, and low monetary outcomes (Maikhuri et al., 2001). Whereas 65 livestock killings by wildlife were recorded by the reserve authority in 1991-1996, 625 killings were reported by locals (Maikhuri et al. (2001). During this period, total compensation provided by NDBR authorities was <5% of the market value of livestock depredation (Maikhuri et al., 2001). Contemporarily, resolving NDBR management conflicts by "compensat[ing] the local farmers for a period of 30–50 years with equivalent of net income from farms/livestock so as they could move away from the area" is an attractive option to 57% respondents – though biased towards the young (Rao et al., 2003).

3.4 Perceived distribution of costs and benefits amongst stakeholders

Whilst all people – including locals and NDBR management staff, irrespective of age, sex or affiliation – felt that local people lost livelihood benefits after the reserve was established, NDBR officials felt that these losses were adequately compensated for by ecodevelopment initiatives. Locals, however, mostly believed that their losses exceeded the gains (Rao et al., 2003). Maikhuri et al. (2000) identify inconsistencies between different stakeholders as sources of tension for residents. Namely, whilst NDBR authorities can auction deadwood for monetary gain from reserve forests, Forest Councils of community forests cannot. Similarly, large expenditures on facilities for park staff are permitted at the expense of locals who have unanimously suffered livelihood losses (Maikhuri et al., 2000; Singh & Singh, 2004; Rao et al. 2000). After local agitation against tourism bans, limited ecotourism was permitted in the buffer zone – however, this prioritized outsider's economic interests, and failed to employ locally-educated youths (Silori, 2007). Collectively, these factors perpetuate residents' perceptions that their interests have been unfairly marginalized (Singh Rana et al., 2003).

4. Outcomes

4.1. Ecological outcomes

NDBR has prompted some improvement in ecological health, particularly benefitting forested areas inside NDNP: the 1982 mountaineering ban ended large-scale tree felling and illegal biomass collection within the reserve (Silori, 2001), supporting a shift from 'sparse' to 'dense' forest cover by 10-12% in the 1990s. However, shortages of 12.83% of fuelwood, and 11.65% for fodder in NDBR suggest that illegal lopping may increase; in the buffer zone, forest cover decreased by 2.54% between 1978-2008 (Tiwari & Joshi, 2009). Whereas the reduction of livestock holdings after NDBR inscription prevented the extensification of agricultural land-use (Maikhuri et al., 2000), reductions in grazing area –from 6188ha to 2433ha after NDNP inscription – doubled stocking densities from 3 to 6 animal units/ha (Nautiyal et al., 2003). Furthermore, cash crops cultivated to supplement income losses incur 6-8 times higher soil erosion rates than traditional crops (Maikhuri et al. 2000). Though formal surveys of wildlife populations within NDBR are infrequent (once per decade), evidence of recovering wildlife populations are traceable through sharp increases in livestock depredation.

4.2. Socioeconomic outcomes

NDBR inscription has initiated significant socio-economic transformation. Particularly, the transhumant population has been widely forced to sedentarise, prompting an erosion of traditional lifeways, nomadic culture, and TEK (Nautiyal et al., 2003). This community has been disproportionately affected by land-use changes; whereas the settled community acknowledged some positives of NDBR, such as economic gains from agricultural diversification, the transhumant population unanimously felt their economic position had worsened (Rao et al., 2003). An influx of transhumant pastoralists to settled villages has also intensified resource pressure: provoking scarcities in fuel, fodder, and other subsistence resources (Nautiyal et al., 2003). Over 90% residents cited a deteriorating farm economy, loss of income from NTFPs, and tourism as negative economic outcomes of NDBR (Maikhuri et al., 2000).

The reserve has also initiated wider social conflicts. Singh Rana et al. (2003) claim inequalities caused by NDBR promoted the corruption and fragmentation of society, instilling a sense of alienation in indigenous people from their homeland. Traditional moral economies have also eroded: since NDBR inscription, resource-rich villages have charged resource-poor villages 20RS/horse, and 4RS/sheep for grazing privileges, which was traditionally permitted for free (Maikhuri et al., 2001), exacerbating inequalities. Certain buffer zone villages were also disproportionately affected. In particular, all of Lata and Peng village meadows were lost to NDNP inscription. These villages were principle beneficiaries of mountain tourism before the ban, and were therefore dually affected: here, annual household income loss was 22342 RS, far exceeding the buffer zone average of 7904 RS (Maikhuri et al., 2001). Tables 2 and 3 summarize further economic losses.

Some losses were more difficult to quantify: gifts from tourists offered significance to villagers that exceeded their monetary value (Maikhuri et al., 2000). Moreover, the tourism ban was lamented by

younger generations for depriving them of opportunities to make friends and broaden their horizons: as compounding the loss of income benefits (Maikhuri et al., 2000; Rao et al., 2003)

Table 2. Selection of economic losses attributed to NDBR inscription. Sources: Tiwari & Joshi (2009); Maikhuri et al. (2001); Rao et al., (2000)

Outcome	% Respondents
Loss of grazing resources	40
Loss of access to NTFPs	23
Loss of income from tourism	24
Loss of property and produce due to wildlife	13

Table 3. The principle economic loss from NDBR inscription, as perceived by locals. Source: Rao et al. (2000)

Impact of NDBR inscription	Value
Loss of income in buffer zone villages (RS/household/year)	7904
Loss of livestock due to depredation (RS/household/year)	384
Loss of agricultural crops due to depredation (RS/household/year)	1285
Loss of fruit crops due to depredation (RS/household/year)	1195
Livelihoods lost 30 years after NDBR inscription	13%
Wool production output	-47%
Per capita availability of forests	-0.46-1.11%

4.3. Ecosystem services

Whilst natural regeneration within the core zone may improve the functioning of some ecosystem services, local communities were deprived of others. Principally, land-use restrictions pushed nomadic and agricultural communities to the margins of subsistence (Tiwari & Joshi, 2009; Nautiyal et al., 2003). More broadly, within indigenous worldviews, biodiversity and culture are inextricably linked, yet this experience with top-down conservation has led to the breakdown of community relationships with nature and environment (Rao et al., 2000). The longstanding sense of holistic wellbeing derived from Bhotia values of nature has diminished (Maikhuri et al., 2000); however, physical wellbeing also suffered significantly. Bans on medicinal plant collection initiated the collapse of the traditional healthcare system, depriving many of accessible healthcare; the intergenerational transmission of TEK was also ruptured (Singh Rana et al., 2003; Rawat & Joshi, 2014). Powerfully, Rao et al. (2000) contend that the failures of NDBR management to recognize local needs has turned residents hostile to attempts to conserve wildlife. Considering the significance of nature under Bhotia religious worldviews, this may represent a spiritual loss that exceeds quantification, and jeopardises wider conservation aims.

4.4. Summary of outcomes

The failure of NDBR to account for the plural values of nature held by its indigenous communities may be responsible for a pronounced breakdown of community-nature relationships (Maikhuri et al., 2000). In compounding the significant economic hardship initiated by the 1962 Indo-China war, tourism bans and access restrictions have consolidated the dependency of locals on dwindling natural resources (Nautiyal et al., 2003). Widespread conflict between park authorities and locals have undermined longstanding and deeply-felt conservation sentiment once evidenced by the *Chipko* movement (Singh & Singh, 2004). As the protection of NDBR – with limited manpower and resources – is difficult to achieve without local co-operation (Rao et al., 2003), these factors may in turn precipitate longer-term failures to protect biodiversity.

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Protected Area Case Study: Chitwan National Park, Nepal

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Context

A World Heritage site, Chitwan National Park (CNP) is situated in the inner Terai region of south-central Nepal. The park was 544 km^2 when established in 1973 but has since been extended to its current size of 952 km^2 (Department of National Parks and Wildlife Conservation-DNPWC, 2019). Ranging from 200m to 815m in altitude, CNP lies within the Terai-Duar Savanna Grasslands of the global 200 ecoregions and is considered a biodiversity hotspot (DNPWC, 2013). CNP supports 70 species of mammals, 546 species of birds, 47 species of reptiles, and 55 species of amphibians (DNPWC, 2019). The park is home to the Greater one-horned rhinoceros, Bengal tigers, and Gharial crocodiles among other endangered species. CNP represents the last remaining Siwalik-Terai ecosystem and is characterized by four major vegetation types: subtropical Sal (*Shorea robusta*) forest; Chir pine (*Pinus roxburghii*) forests; riverine forests predominated by *Dalbergia sissoo*, *Acacia catechu,* and *Bombax ceiba*; and Grasslands dominated by *Saccharum spontaneum* (DNPWC, 2013). Temperatures range from a minimum of 8 °C to a maximum of 37 °C in the park's tropical- subtropical monsoon climate with an annual rainfall of about 2,600mm (DNPWC, 2013). The park borders Parsa National Park and Valmiki Tiger Reserve forming larger connecting corridors for wildlife movement to India in the south, lesser Himalaya in the north through the Barandabhar forest corridor, and churia hills in the west through Daunne forest (DNPWC, 2013). Two major rivers—Narayani and Rapti mark the boundary of the park to the north while the boundary to the south extends to the Reu river at the India-Nepal border (DNPWC, 2013). Narayani river is known to harbor the endangered Gangetic dolphins.

Before the establishment of CNP, Chitwan valley— where the CNP is currently located— was under royal tenure. Until the 1950s, it was used extensively as the royal hunting reserve by Nepal's then ruling class Ranas to entertain foreign and domestic dignitaries. The Ranas established rhino patrol units and enforced strict protection measures including jail terms and even the death penalty for ordinary Nepali in the case of rhino poaching (Mishra, 2008 and Regmi, 1988 as cited in Budhathoki, 2012). Prevalence of malaria also deterred outsiders from entering the Chitwan valley although indigenous Tharu people, reportedly immune to malaria, resided in the valley (Guneratne, 2010). Other indigenous groups such as Bote, Mushakher, Kumal, and Darai also reportedly lived in the valley (Baral, 2013; Budhathoki, 2012). The indigenous peoples enjoyed free access and use rights to the natural resources for their subsistence and had a negligible impact on the wildlife protected by the Ranas for their recreation (Baral, 2013). Local people including Tharus assisted Ranas and their dignitaries on hunting excursions (Baral, 2013).

After the collapse of the Ranas, the government of Nepal with support from the United States Agency for International Development (USAID) launched a malaria eradication campaign in the Chitwan valley (Budhathoki, 2012). In the 1960s, the newly malaria-free Terai saw a mass migration of people from the

mid-hills of Nepal which proved deleterious to the indigenous peoples and the wildlife. For instance, by the end of the 1950s, 70% of the 2600 km^2 forests and grassland in the valley had been converted to agricultural lands (Caugley,1969 as cited in Adhikari, 2002). Similarly, the population of rhinoceros declined from 800 individuals in the 1950s to about 100 in the 1960s (Martin & Vigne, 1996). The human population in the valley grew threefold (DNPWC, 2013). Indigenous peoples such as the Tharus became the minority and lost their lands to the migrants (Guneratne, 2010). As a response to the rapid decline of rhinoceros and deforestation, the royal decree issued in 1964 established the rhino sanctuary, a precursor to CNP (Heinen & Shrestha, 2006). Villages within the rhino sanctuary were removed (DNPWC, 2013). The Ministry of Forest regulated access to resources and grazing within the rhino sanctuary through a system based on permits (Bolton, 1975).

CNP establishment

The National Parks and Wildlife Conservation Act (NPWCA), 1973 provided the then king and his government with broad legal authority to form protected areas in Nepal including national parks and reserves. In 1973, CNP became Nepal's first National Park. CNP incorporated the rhino sanctuary established to bring back the one-horned Asian rhinoceros from the precipice of extinction.

According to the first management plan published, the primary goal of the CNP was to conserve "indigenous Terai fauna" especially the endangered species including the rhinoceros, tiger, gharial crocodile, and the Gangetic dolphins "in their natural habitats" (Bolton, 1975). Other management objectives included: "conservation and relationship with local residents", research, recreation, and management of infrastructure within the park (Bolton, 1975). In this original management plan, Bolton suggested that CNP "maintain good relations" with the local people through the formation of the local coordinating committee and share profits from the park with the people. But no specific objectives regarding social or economic issues of local people were recommended in the management plan. Conservation was to be optimized by CNP through the minimization of illegal extraction of natural resources by local communities, phasing out legal extraction of resources over time, and addressing wildlife crop damage via fencing and acquisition of a buffer area between the park and the agricultural lands (Bolton, 1975). The trade-offs between conservation, infrastructure building, and recreation within the park were addressed by keeping the environmental impact of approved activities as low as possible (see Bolton, 1975).

The "fines and fences'' approach guided the protection of the CNP, making entry into the park without permission illegal (Bhattarai et al., 2017; Heinen & Shrestha, 2006). The NPWCA of 1973 legally sanctioned this approach which also gave the government authority to prohibit the extraction of resources (Heinen & Kattel, 1992). Shortly after its establishment, the Nepali army was deployed to CNP to enforce the park rules and regulations. Currently, the army, park wardens, and rangers support the legal activities of the park. The actions of security and administrative officials helped prevent the extinction of endangered species at CNP but the conflicts between the park and local people continued. To address negative perceptions of the park and to discourage illegal resource extraction, the CNP administration addressed local peoples' customary right to collect materials such as thatch grass and reed for building traditional

houses by launching the Grass Cutting Programme (GCP) in 1976, three years after the park's establishment (Stræde & Helles, 2000). CNP administration currently permits traditional fishing and sustainable extraction of materials such as grass, rattan, resin, etc. by indigenous peoples (IUCN, 2017). Permits regulate the extraction of these resources. In the early days of GCP, local people were allowed to enter the park for 15 days to collect building materials. The time allotted to collect grass has now been reduced to three days (DNPWC, 2016). Straede and Helles (2000) pointed out that the extraction of resources increased even though the number of permits sold did not, and recommended a "multiple-use management scheme" based on "people's collection pattern and behavior" for the GCP program. They also suggested staggering openings of various sections of the park over time instead of opening the whole park simultaneously once a year for resource collection might be more sustainable.

With the growing recognition that the long-term sustainability of parks like CNP depends on community participation, DNPWC enacted the fourth amendment to NPWCA of 1973 and established buffer zones around the park (Bhattarai et al., 2017). A buffer zone covering 750 km^2 around CNP was established in 1996 which paved the way for local communities to undertake community-based forestry management, access forest resources for livelihood and economic need, and receive revenues generated from the park for community development (DNPWC, 2013). Regulations and guidelines implemented by the government and a network of community and Buffer Zone User Groups (BZUGs) further institutionalized the buffer zone management.

Decision making, values

As with the early protected areas in the world, indigenous and local communities were not consulted in the establishment of the park. CNP failed to consider the needs, rights, and worldviews of the indigenous people including their knowledge systems. Leading up to CNP's establishment, the government's perspective on conservation predominated. This view was supported by the scientific survey of the wildlife and their habitat conducted by the Nepali government with assistance from the Food and Agricultural Organization (FAO) and the United Nations Development Program (UNDP). This then led to the creation of the DNPWC in charge of protecting CNP (Heinen & Kattel, 1992). The recommendation based on the surveys became the impetus for the park establishment to protect declining wildlife (Heinen & Shrestha, 2006). No civil society or Non-Governmental Organizations (NGOs) played a role in the establishment of the CNP. Although the research results on the rhinoceros' population by the International Union for the Conservation of Nature (IUCN) and Fauna Preservation Society of London research influenced the establishment of CNP (see Bolton, 1975).

In the establishment of CNP, the ecological values championed by the government i.e. strict protection of wildlife predominated, while cultural values and preferences of local communities i.e. customary use of resources were excluded. The economic value or use value as perceived by the state (e.g., tourism, recreation) was reflected in management decisions. The government largely ignored the use-values of CNP to local people (e.g., food, energy, materials for home construction, etc.). The customs and spiritual beliefs of indigenous Tharus expressed in many of their festivals depended on the natural resources extracted from CNP and surrounding forests (Mclean & Stræde, 2003; Mclean, 1999). The dismissal of the

cultural attachments to the natural environment and the use-values of CNP to local people was evident in the very establishment of the CNP that constrained rights to resources.

CNP operated based on a top-down approach with the decision-making power lieing with the state. The conflict between park managers and local people, therefore, was common particularly on the issue of rights to resource access by the local people within the park (Sharma,1990). At its establishment, local people benefitted from the regulated access to thatch grasses. It is unclear from the first management plans what other benefits were legally available to local people at CNP. Bolton (1975) in the management plans noted that unauthorized extraction of seasonal food, fodder, fuelwood along with grazing livestock and fishing occurred within the park. Given that the land outside the park was highly degraded, the park emerged as "the only source of supply of certain forest products for miles around" (Bolton, 1975). The restrictions to the park's resources caused social and economic hardships to local people while also failing to protect the park as was intended by the government.

The establishment of CNP also resulted in the permanent relocation of community settlements. Local people were forcefully removed, and they had no influence on the planning of the relocation (Mclean & Stræde, 2003). Padampur, the last of the villages within the park boundary, relocated voluntarily. The local people received some in-kind monetary and land compensation for relocation (see Padampur as example-Joshi, 2013; Sharma et al., 2011). In the case of Padampur, some landless families received land compensation and perceived relocation positively however, local people including the landless perceived land compensation to be inadequate for their livelihood (Mclean & Stræde, 2003).

The indigenous and local communities' perception of the distribution of costs and benefits of CNP establishment and relocation varies. Studies show that local people perceive the CNP establishment economically benefited them via jobs in the tourism industry and access to better infrastructure but at the cost of their socio-cultural identity and livelihoods (Karanth & Nepal, 2011; Poudel, 2014; Tiwari & Upadhaya, 2019). Even in the case of voluntary relocation of Padampur, studies show that Tharu communities perceive relocation as a disruption to resource use patterns (Lipton & Bhattrai, 2014), and find restriction to access to traditional resources "troubling" (Joshi, 2013). The same resettled communities in Padampur however, perceived relocation as beneficial in other ways such as improvement in health services, access to facilities, ownership and title to lands, and social ties (Dhakal et al., 2011; Joshi, 2013).

Changes over time

CNP's management and governance approaches shifted over the years from strict protectionism to a participatory model that encourages national and international stakeholder involvement (DNPWC, 2013). In terms of management, CNP's focus changed from an emphasis on species to a biodiversity, ecosystem, and landscape approach (Bhattarai et al., 2017; Paudel et al., 2007). A shift from site-based conservation to a landscape-scale approach to conservation in Nepal started with the Terai Arc Landscape (TAL) project in the 2000s by the Nepal government in collaboration with WWF (Ministry of Forests and Soil Conservation, 2015). This approach emphasized the importance of corridors and connectivity for CNP's wildlife and supports the implementation of CNP's management plans.

CNP management changed over time with the needs and demands of the people living in the vicinity of the park. In terms of resource management, CNP originally established buffer zones for people's use of natural resources to counter the restrictions within the park. But now buffer zone management plans are created collaboratively with buffer zone communities (DNPWC, 2013). Heinen & Mehta (2000) indicate that though there is a legal mechanism in place for local people to participate in the buffer zone management process, the managerial structure remains largely top-down. One tangible change has been the sharing of revenue by CNP with buffer zone communities. Currently, CNP shares 30- 50% of its generated revenue with the buffer zone communities (DNPWC, 2013). The revenues fund community activities such as the construction of roads, income generation, and conservation education programs, etc. The buffer zone initiative has been successful in integrating conservation and development needs. However, according to Paudel et al. (2007), long-standing systemic forces like wealth disparity and caste persist, shaping the allocation of costs and benefits as well as access and use of community forest resources inside buffer zones.

Changes in park security also occurred. The army of Nepal and CNP officials—primary security providers of the park— are now supported by community-based anti-poaching units who, with stronger frequent patrols, have effectively curtailed illegal poaching of wildlife in the park since the late 2000s (Mahatara et al., 2018). A debate on the anticipated changes in management structure for CNP and its buffer zones under the new 2015 constitution of Nepal is ongoing. If the change occurs, the management power of CNP could shift from state to the jurisdiction of the governments of four provinces which may complicate the management process (IUCN, 2017). In the case of buffer zones, such changes may "disempower and disincentivize" existing community-based institutions such as BZUGs (Thakali et al., 2018).

Both ecological and social concerns inform the process of management at CNP. Park management focuses heavily on the poaching of endangered species which they consider the major challenge. Besides anti-poaching measures, several projects such as the tiger ecology project, gharial breeding, rhino translocation, and the elephant breeding center are all part of the management plan (DNPWC, 2013). The ecological condition of wildlife habitat also informs the management processes. For instance, invasive plant species in the grasslands affecting rhinos and tigers are removed via prescribed burning and cutting (DNPWC, 2019). The park also responds to social concerns of human-wildlife conflict through relief measures such as compensation to farmers for crop damage by wildlife as well as through revenue sharing programs which among other activities works to elevate the stewardship value of CNP among local people (see DNPWC, 2013). Local and international NGOs like the National Trust for Nature Conservation, Federation of Community Forest Users Group, and World Wildlife Fund (WWF) work towards balancing conservation with development. The Nepali government with partners such as UNDP and WWF responded to human-wildlife conflict through the Parks and People Project (Bhattarai et al., 2017). This project conducted outreach activities to bridge the gap between local people and the CNP officials (Spiteri & Nepal, 2008). One-way CNP mitigates the gap between park and people is by incorporating the use-values and preferences in the park's management and decision-making processes whereby indigenous and local communities enjoy the right to use resources from the park and manage the buffer zones collaboratively with the state. In recent years with an organized grassroots movement, indigenous and local communities have exerted pressure to gain access and use rights to resources (Paudel et al., 2010,

2013). For instance, in 1997, Majhi, Musahar, and Bote communities with the support of NGOs organized protests to demand customary rights to fish in the CNP (Tanaka, 2011). They succeeded to a point, however, access and use rights are regulated via paid licenses (Jana, 2007).

The park's management and governance process included the conservation values of the NGO's. Currently, major national and international conservation organizations coordinate with the state to decrease poaching via buffer zone project activities and conservation breeding centers among others for example (Acharya et al., 2020; Martin et al., 2013)

Through in-situ and ex-situ (captive breeding) management programs the park saved the nearly extinct rhino and tiger species. The rhino population increased from 100 individuals in1960s to 605 in the last survey conducted by the government (DNPWC, 2015). The rhino population is in stable condition with zero animals poached since 2011 (Bhattarai & Karki, 2020). The status of other endangered species such as tigers, Asian elephants, and gharial crocodiles are shown to be improving as well (see DNPWC, 2017). A government survey in 2018 indicates an increase in the tiger population in Nepal but a decrease at CNP with 93 individual tigers from 120 recorded in 2013 (Dhakal et al., 2014; Mandal, 2018). Although the dip in the tiger numbers at CNP may be due to natural causes, tigers, rhino and other endangered species are still vulnerable as hunting and poaching remain a threat. The DNPWC (2013) warns that without park security posts rhino poaching would increase. CNP and its buffer zone also provide critical habitat for migratory, wintering, and breeding grounds for birds. A recent study shows that livestock and human presence, and distance of habitat to roads and villages impact the presence, distribution, and abundance of the already threatened birds (Adhikari et al., 2019).

Conservation goals hinge on the ecological integrity of CNP. Satellite imagery analysis of forest cover between 1988-2017 shows the CNP's forest to be "minimally impacted" despite the increase in the human population outside the park (Pokhrel, 2018). An increase in forest cover in adjacent buffer zones has also been reported and attributed to the implementation of community management programs and conservation awareness among buffer communities (Neupane et al., 2017; Stapp et al., 2016). Other studies indicate a decline in forest cover and grassland trends towards agricultural land (Baidya et al., 2009; WWF, 2013).

The grasslands of Chitwan declined from 20% in 1970 to about 10% in 2015 mainly due to invasive plant encroachment, although domestic animal grazing and haphazard construction of infrastructure also impacted the ecosystem (DNPWC, 2016, 2019). The invasive plant *Mikania micrantha*, rapidly encroaching on floodplains, grassland, and most riverine forests, reduces suitable habitat and food for rhinos (Murphy et al., 2013; N. Subedi, 2012)). In addition, man-made spurs and dykes for flood control obstruct the formation of successional rhino habitats after the seasonal flooding (Subedi et al., 2013). While seasonal flood is critical to maintaining rhino habitat, the acute flooding itself endangered rhinos as they get swept away from CNP (BBC, 2017).

Social outcome

Over the past 70 years, CNP and the surrounding buffer zones have been associated with a wide range of social outcomes. These outcomes show both positive and negative effects of the establishment and management regimes of CNP. First, the establishment of CNP resulted in the displacement of indigenous and local communities. The indigenous communities such as Tharus, Botes, Musahar, Darai, and Kumal were particularly hard hit as they already lived under structural inequalities reinforced by their historical-cultural strata in the caste system of Nepal (Dongol, 2018). Even now, Tharus living around CNP are perceived as Madeshi (a word referring to an Indian inhabitant of the Terai) although they are indigenous peoples of Terai (Guneratne, 2010). In terms of livelihood, low caste and marginalized groups such as the Tharus often suffered most as a result of CNP establishment as they depended most on the forest resources which CNP restricted (Mclean,1999). In the case of Padampur--the only village to voluntarily relocate—livestock holding decreased due to lack of grazing lands which in turn impacted their household economy and food security (Sharma et al., 2011).

A study by Lipton and Bhattrai (2014) found that Tharus perceive restriction to access and withdrawal of resources such as firewood, fodder, medicinal plants, etc. have disrupted their resource use patterns. Similarly, a study by Sharma et al. (2011) found that due to restrictions in fishing activities, people who used to fish 6 days a week only fished once a month after relocation from CNP, a significant loss of the protein food source. As discussed earlier, the government of Nepal responded to the needs of the people by establishing a buffer zone, the only legal source of forest products for many local communities around the park. In the case of buffer zone management and governance, however, studies indicate that management activities and policies fail to address the needs of the marginalized, poor and uneducated people (Budhathoki, 2004) and that the “elites” have captured the buffer zone resources and revenues (Dongol, 2018; Jones, 2007). Kandel et al. (2020) found that access to resources from the buffer zone community forests has become further restricted since the introduction of ecotourism.

CNP, the most visited protected area in Nepal, generates revenue via park entrance fees, recreational elephant and boat rides, lodging, etc. In 2019, more than 185,000 international tourists visited CNP (Paudel, 2019). The annual revenue generated by CNP surpasses its operating costs (Koirala et al., 2012). Studies link tourism to livelihood enhancement among buffer zone communities (Nyaupane & Poudel, 2011; Sedhain & Shah, 2018). And livelihood opportunities in tourism create a positive attitude towards conservation at CNP (Nyaupane & Poudel, 2011). Nepal and Spiteri (2011) show that local people also perceive livelihood benefits from the park’s ecotourism. However, distance from the park to settlement i.e. people living near the park’s entrance, and the individual’s level of participation in tourism affected the benefits received (Nepal & Spiteri, 2011). The socioeconomically disadvantaged are also least likely to benefit from tourism (Kandel et al., 2020). Lipton and Bhattarai’s 2018 study show that indigenous Tharus perceive that tourism due to CNP changed their culture (from youth abandoning indigenous clothing to ceasing to speak the indigenous language). But at the same time, Tharus perceived that the cultural shows to tourists visiting CNP would “sustain and promote” their culture. In terms of impacts on cultural identity, in the case of Padampur, the Tharu people perceived a sense of loss of community cohesion that existed before they relocated as their new settlement lacked the layout of their old settlement (McLean, 1999).

The human-wildlife conflict continually challenges the park and people. Loss of human life, livestock loss, and crop destruction by wildlife from the park (Bhattarai et al., 2019; Lamichhane et al., 2018), retaliatory killing, and land encroachment by humans (Bhattarai et al., 2017; Gurung et al., 2008; Heinen & Kattel, 1992) created a hostile relationship between park management and the local people. To reduce human-wildlife conflict, CNP created buffer zones and implemented relief programs such as monetary compensation in the case of human and livestock casualties, destruction of crops and properties (DNPWC, 2013). However, studies also indicate that human-wildlife incidents are high in the buffer zones. For instance, Lamichhane et al. (2019) and Ghimire (2019) recorded an increase in crop damage by herbivores like wild boar and rhino in buffer zones. Timilsina (2014) found that 60% of respondents (out of 100 people interviewed) were involved in using poisons or traps to deter wildlife from damaging crops. While Gurung et al. (2008) found that forest restoration in buffer zones which included grazing restrictions increased forest cover and prey species for tigers, drawing more tigers into buffer zones possibly resulting in more tiger attacks on humans. Restriction in the use of the park's resources may have also exacerbated the human-wildlife conflict. For instance, grazing restrictions in buffer zones led to increased fodder cutting for stall feeding (Gurung et al., 2009) possibly contributing to the higher incidences of attacks on humans by tigers (Gurung et al. 2008).

Besides the monetary compensation in the case of human-wildlife conflict, CNP implemented programs such as conservation education on the ecology of species, removing "problem" species from the park, better protection of livestock via predator-proof night corrals, and community development programs that aim to economically strengthen the buffer zone communities via revenue sharing so that they are better able to adapt to losses due to wildlife (Bhattarai et al., 2019). Silwal et al. (2013) found that CNP buffer zone management, however, focuses more on community development such as infrastructure building than on prevention and mitigation of human-wildlife impacts. The proximity of people, their farms, and livestock to the park mean mitigative and preventative measures by CNP will remain part of the conflict management for the foreseeable future.

The conflict between the park and people due to land encroachment is ongoing. For instance, during the Maoist war between 1995-2004, many people encroached on the CNP for security (Aryal et al., 2017). In other cases, landless people claim land in the park. In July of 2020, the semi-nomadic Chepang indigenous people were forcefully removed from the Park. This was condemned by Amnesty International as a violation of human rights (The Kathmandu Post, 2020).

Ecosystem Services

CNP provides a range of provisioning services to the buffer zone communities in the form of fuelwood, fodder/animal bedding, and food (Pahadi et al., 2014). The same study showed that buffer zone communities harvested 8,275 tons of non-timber forest products between October 2012 and January 2013, the monetary value of which was 8,88,37000 Nepalese Rupees (NRs.). Buffer zone forests around the CNP also provide local people with firewood, timber, and fodder. In one buffer zone community of the CNP, households harvested an average of 2,400 kg of firewood and 3,024 kg of fodder yearly (Bhandari & Zhou, 2017).

In terms of support services, the forests of CNP and buffer zones provide habitat to endangered species of global significance. Forests within CNP and buffer zones are also important for pollination services. A recent study showed that mustard farms near the forests of CNP and buffer zones had a higher diversity of insects such as bees and that these forests provided materials for nesting (Devkota et al., 2020). Apart from the local people, ecosystem services provided by the CNP equally offer value for tourists. CNP and its buffer zones are popular tourist attractions due to their biodiversity and recreational opportunities (e.g. birdwatching). Tourists were willing to pay a higher entrance fee (proxy to capturing the value tourists held for CNP) to the park (Cook, 2011). Based on contingent valuation, KC et al. (2013) reported that tourist's willingness to pay for recreational and aesthetic services from a buffer zone community forest was US $3.8 million per year. When tangible and intangible goods and services for CNP were valued, it proved to generate the highest total economic value (NRs 16, 093 million) of all protected areas in Nepal (DNPWC, 2017). Most studies on the ecosystem services of CNP are based on economic or monetary valuation. The total economic value of CNP's carbon sequestration services is estimated at NRs. 37, 687 (DNPWC, 2017).

Socio-cultural valuations are based on local people's perception of negative (loss of sense of identity) and positive (infrastructures such as roads, health facilities, etc.) due to relocation from CNP establishment (Lipton and Bhattrai, 2014). A study by Nepal & Weber (1994) in the early days of buffer zone implementation in CNP found that the communities relocated outside CNP valued firewood, fodder, grazing livestock, and flood control as the preferred ecosystem services. Relocated communities still prefer these services and much of the wildlife-human or park and people conflicts stem from people legally or illegally extracting firewood and fodder from the park as well as grazing livestock near the park (Gurung et al., 2009).

Conclusion

The original values reflected in the park were driven by the state's interest in wildlife and subsequently national and international wildlife conservation. Over time the park's strategy evolved to reflect local interests albeit in a limited way and made some strides toward including local peoples in park management. CNP achieved some impressive conservation success but at a cost to the local people. The socio-ecological outcomes remain mixed.

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Protected Area Case Study: Masoala National Park, Madagascar

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Context

Masoala National Park is one of the largest protected areas (PAs) in Madagascar, and a flagship for global biodiversity conservation. Established in 1997 as an International Union for Conservation of Nature (IUCN) Category II Site, the Masoala National Park protects a complex of 240,000 ha of biodiverse habitat, including the largest remaining lowland coastal moist evergreen forests in Madagascar, supported by some 3,000 mm of rainfall on an average year. In also includes three coastal marine parks, the Nosy Mangabe Special Reserve island, and 1,000 ha of buffer habitat allocated for sustainable use (Kremen *et al.* 1996, p. 64). It is home to at least 62 endemic flora species and 11 lemur species, three of which are endemic to the park (Goodman *et al.* 2018). In recognition of its importance to global conservation, the Masoala National Park was named a UNESCO World Heritage Site in 2007.

Over 145,000 people live within 10 km of the Masoala National Park, up from 44,500 estimated just before the park's creation (Borgerson *et al.* unpub. data; Kremen *et al.* 1996: 66). These communities depend on rice cultivation for subsistence, using both irrigated plots in the valley bottoms and upland rain-fed shifting cultivation systems (practices locally known as *horaka* and *jinja* respectively). Fishing and cultivation of cash crops, including vanilla and cloves, are also important sources of cash income for local communities. Communities depend on the region's rich natural resources for economic and personal health, as well as for food security (Borgerson *et al.* 2019), local cosmology (Golden 2014), and cultural identity (Keller 2008). Masoala's forests support people in myriad ways: wildlife are caught for meat; timber is harvested for the construction of houses, furniture, and transportation; non-timber forest products (NTFPs) are collected for roofing, weaving, and medicine (Kremen *et al.* 1998); waterways feed croplands; minerals are extracted; and the rivers and coasts are fished, harvested, and travelled. The remaining forests surrounding this protected area are also perceived by local people as space held in reserve for future agricultural lands. Because such expansion of agricultural land would conceivably improve food security within one of the world's least food secure nations (EIU, 2019), there are strong incentives to clear additional forests for food, and thus the expansion of agricultural clearing is the main threat to Masoala's biodiversity. Overall, socio-economic conditions of populations around the park are poor, more than 75% of households are food insecure, more than 95% are under the global poverty line, and child malnutrition is high (Borgerson *et al.* 2019). Communities have limited access to safe drinking water, electricity, health services, and K-12 education, a situation further exacerbated by the remoteness of most settlements, lack of roadways (both regionally and connecting to national economic centres), and the recurrent impact of tropical cyclones (Hatchell 1999).

New agricultural land for members of communities bordering the Masoala National Park is primarily acquired through forest clearing followed by cultivation, which grants customary ownership rights (Keller 2015). The land thus obtained can be passed down to subsequent generations, connecting ancestral owners to past and future generations in a continuous chain that constitutes a central foundation for both the cultural and socio-economic practices of local communities (Keller 2008). Both requests for formal permits to clear new forest land and land titling have been, and continue to be, rare in most communities that border the park (Kremen *et al.* 1999: 1061). Inequities in legal access to land because of wealth and status are common and are exemplified by differential access to irrigated rice cultivation plots. Such inequalities are to some extent related to the educational background of households, or the political connections individuals can draw on, also mediating who and how different groups enjoy benefits associated with the park (Keller 2015: 147-48).

Protected Area Establishment

The forests of the northeastern part of the Masoala peninsula have held the status of *Resérve Naturelle Intégrale* (Integral Natural Reserve) since 1927, being reclassified as the *Forêt Classée* (Classified Forest) du Cap Masoala in 1964 (Goodman *et al.* 2018: 766). The contemporary push for the conservation of most of the forests in the Masoala peninsula can be traced back to the late 1980s, when the area was declared a priority for international conservation (Mittermeier *et al.* 1987) and was included in Madagascar's National Environmental Action Plan (World Bank *et al.* 1988), one of the first such plans implemented in Africa. The park began as an Integrated Conservation and Development Project (ICDP) in the late 1980s, at a time when there was a global movement to incorporate ICDPs into the creation of protected areas. Like many other examples worldwide (Robinson and Redford 2004), Masoala shared the challenges associated with ICDP approaches, particularly in regard to the difficulty of delivering development to the extent needed to ensure the sustainable use of natural resources, and the fair distribution of the benefits and burdens related to the conservation intervention. The project depended on the support of the United States' Agency for International Development (USAID), and after an earlier failed start, was eventually implemented by CARE International, the Wildlife Conservation Society (WCS), and the Peregrine Fund, under the guidance of the National Association for the Management of Protected Areas (ANGAP, the parastatal organisation in charge of the managing the national parks of Madagascar) and the Malagasy ministry of forests (Kremen *et al.* 1999). The ICDP later became a National Park, co-managed originally by ANGAP and WCS, and is currently managed exclusively by Madagascar National Parks (MNP, formerly ANGAP), with WCS providing technical support (WCS 2020).

Masoala National Park was established to assure the continuity of its unique forest and marine biodiversity, while enabling the sustainable social and economic development of local communities around the park, goals that were mainly articulated by the organisations in charge of the creation of the park. In ecological terms, the design of the park was aimed at encompassing an area large enough to buffer against both human and natural disturbances, to cover all habitat and species found in the area and protect viable populations of rare or endangered species, and to assure connectivity of the park's different areas (Kremen *et al.* 1999: 1057). This aspect of the park's design was mainly informed by scientific knowledge, generated through biological inventories on avifauna, primates, small mammals,

butterflies and beetles and plants. The park design process looked for ways to protect these important biodiversity values with the least conflict with the people living in the park. A spatially-explicit analysis of the threats to this biodiversity based on likely expansion of shifting cultivation, suggested that the region most likely to experience agricultural expansion was not as valuable for biodiversity conservation, and the majority of this region was therefore left outside of the park borders. A separate analysis, based on timber inventories determined that much of this same region might be suitable for sustainable forest management, and the park project made significant efforts to develop forest management plans that would provide income to local people through sustainable selective forestry, in the hopes that income from forest management would provide incentive to resist agricultural expansion Local knowledge was obtained through focus group interviews on socioeconomic and agricultural aspects conducted in 25 villages around the park (Kremen *et al.* 1999: 1058), and gathering of information on what local people considered their agricultural and forest land, which was used together with timber inventories to estimate potential for sustainable forest resources use rates. However, according to some scholars, critical cultural local values on forest land, such as the connection with both one's ancestors and descendants that accessing agricultural land by clearing forest represents for local communities, were left aside from the criteria informing the park's design, interrupting an inter-generational process of growth and rooting on the land (Keller 2008).

The conservation of the park's unique biodiversity depends on reducing anthropogenic pressures which are also central for local livelihoods, such as timber extraction and trade, unsustainable fishing, hunting of endangered species, and the conversion of forest land into *jinja* fields (Kremen *et al.* 1996: 63; Goodman *et al.* 2018: 776). For this reason, special emphasis was put in the design of the park on promoting education and on the provision of sustainable alternative livelihoods for residents which particularly aim to reduce the incentives for the practice of shifting cultivation. These included intensive rice cultivation, stabilization of shifting cultivation by crops rotation, artisanal production, or eco-certified forestry, that were being tested in three pilot watersheds before the park was established (Kremen *et al.* 1996: 65). However, insufficient financial and human resources have, so far, prevented the implementation of development activities of either sufficient scope or intensity, to include all households and communities. This is especially true for households which are remote, have high access to forest resources, and are of low socio-political and economic status, but are challenging to reach in terms of infrastructure and logistics.

Despite the original intent and substantial effort devoted to promote forest conservation through engaging local communities in a variety of income-generating activities dependent on forest conservation (i.e. sustainable forest management, ecotourism), the loss of support the ICDPs experienced since the late 1990s meant a move towards larger landscape scale conservation approaches and a stronger focus on ecosystem and watershed protection (Hanson 2009). This means that forest conservation in Masoala has eventually been achieved through a strict protection regime, with a considerable focus of effort on monitoring and patrolling (Andrianjara *et al.* 2013), more recently through technology-based conservation

tools, such as web-based fire alerts[1], or the Spatial Monitoring and Reporting Tool (SMART[2]). Even if enforcing regulations were not within the park manager's (i.e. MNP) responsibilities, punishment of infractions has also been relatively common, in some cases with prison penalties for cultivating land within the park (Keller 2015: 136-38). Elected government officials from the department of water and forests of the national ministry of the environment work with park officials at each level of civic infrastructure, as only they have the authority to arrest legal transgressions within the park. The administrative and climatic realities of the park add further complexity to the conservation of this landscape. Masoala National Park is geographically split between two administrative districts which include at least nine communes and many small, very remote villages. The region is also both cut off from national infrastructure because of the impassibility of the National Road 5 (the closest road to the park), due to poor road conditions across all seasons and locally because of a lack of roads within the peninsula. Travel on the peninsula is frequently prevented by cyclones and poor weather during the austral winter, both at sea and along rivers and small trails within its interior.

The operating costs of the park were envisaged to be obtained through foreign aid during the parks' first phase, and then through a range of revenue sources, mostly from NGOs and other donors. Ecotourism was also envisaged as a steady source of revenue for running the park and contributing to the development of local communities (Kremen *et al.* 1999; Ormsby and Mannle 2006), although the limitations of its ability to entirely support the park were recognized early on. The recurrent political crises striking Madagascar—entailing sharp drops of tourist arrivals to the country—recent border closures to prevent the spread of pandemics, and the remoteness of the park, in particular a lack of access via national highways and dependable air transport, have meant that visitor numbers have never achieved 10,000 visitors/year as originally envisioned when the park was created (Kremen *et al.* 2000). Instead, the number of tourists visiting Masoala remains at approximately 3,000 per year (Goodman *et al.* 2018), many only visiting the uninhabited island Nosy Mangabe. Both in absolute and relative terms, this is far lower than the revenue inflow that tourism constitutes for other smaller and more accessible national parks in Madagascar, such as Ranomafana, which receives more than 20,000 visitors per year (Goodman *et al.* 2018). Without these sources of revenue, the park continues to be supported by a range of donors, including several NGOs and the Zurich Zoo, which opened a 1.1 ha replica of the Masoala ecosystem in the zoo's facilities in Switzerland in 2003 and provides some US$125,000 annually for operating costs and development projects in the area (Zurich Zoo 2020).

Decision Making and Values

The park was designed by a team of Malagasy researchers from CARE International and WCS with support from foreign researchers, the former transitioning into positions as the park director, park management, and park rangers employed by MNP (Kremen pers. comm.).

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[1] https://forestwatcher.globalforestwatch.org/

[2] https://smartconservationtools.org/

Although the process of establishing the park was at first received by local communities with approval (Kremen *et al.* 1999), lack of significant collaboration with local communities in the designing of the park may have contributed to both the lack of a sense of ownership over the conservation objectives of the park by residents and an absence of empowerment and access to sufficient alternatives to enact such objectives (Marcus 2001; Keller 2015). An illustrative point in this regard is that implementation of the park appears to have encouraged a phenomenon of pre-emptive forest clearance for the expansion of *jinja* fields, detected in the years leading up to the park's creation, along the western border of the park (Keller 2015; Llopis *et al.* 2019).

Involvement of local communities in the management of the Masoala National Park has been mostly achieved by the transfer of management rights in the buffer areas around the park to communities in the park's periphery. However, while this transfer involves devolving rights to local communities, local residents might perceive the procedure as being unfair for at least two reasons. First, local communities might have perceived the park as divesting them of rights to land they perceive as rightfully theirs. And second, once communities sign contracts to receive the transfer of management rights for lands included within the protected area's buffer zone, they became responsible for enforcing substantially more restrictive regulations. Yet local communities may not have sufficient means or incentives to enforce park rules or deter park access (Llopis *et al.* 2019). Starting in 2013, further efforts to strengthen co-management with local communities were undertaken, including the setting up of advisory committees bringing together community representatives, elected authorities, and technical and financial partners. Further integration of the *dina* (local regulations agreed between communities and accepted by local authorities) into protected area management and law enforcement strategies is currently being pursued.

However, collaboration between local communities and park management has proved protractedly challenging, in part because in some communities, land already under cultivation fell within the park's core area (Keller 2015). Although provisions were made in the design of the plan for compensating households whose agricultural fields fell inside the park when it was established, payments either insufficiently covered the long-term costs of land-loss, or in the worst cases, never materialised (Keller 2015: 134-36). Further, even if the park's design strived not to include human settlements within the core zone, some scattered households within this zone, and considered as temporary, were relocated to a new settlement founded *ad hoc* outside the parks' core boundary in what is known as a *Zone d'Occupation Contrôlée* (controlled occupation zone), an area where residents were allowed to continue living, but further agricultural land expansion was not permitted (Kremen *et al.* 1999). Besides the relocation, this episode also involved alienating agricultural land already in use, which could have further contributed to a feeling of resentment against the park and its objectives (Keller 2015: 141-43).

Once the Masoala National Park was created, while residents were aware of the park's existence, the involvement of different NGOs and subsequent changes in priorities led to confusion about the park's objectives among local inhabitants (Ormsby and Kaplin 2005). Such shift in priorities would have been reflected in the move from the focus of the ICDP on promoting integrated welfare, with a management strategy addressing economic incentives of local populations based on natural resource use indicators, to an approach more strongly relying on forest clearing indicators and surveillance and enforcement as the

main management strategies, aimed at deter behaviour but not necessarily addressing incentives. This shift in the project's management would have confused local residents, whom, once the ICDP ceased it activities, nonetheless came to perceive it was a duty of the park's staff to continue delivering development projects associated with the ICDP to the area. Illustrating this point, shortly after park's creation, residents who showed a positive perception of the park did so in relation to the development projects related to the ICDP (Marcus 2001; Ormsby and Kaplin 2005), with residents in some communities further stressing that development should accompany, if not precede, conservation initiatives (Llopis *et al.* 2020). While many communities continue to recognize the important role of the park in protecting the resources on which they depend, they continue to lack any sufficient alternatives to unsustainable resource use.

Many local people see their relationship with the park as one more concerned with external powers than forest conservation (Keller 2009: 77). This is reinforced by the history of natural resource management and exploitation by powers external to the local context. As in many parts of Madagascar, and in Masoala in particular, these actors included the pre-colonial Merina monarchy based in the central Malagasy highlands, the French colonial rulers, and the post-colonial state and its alliance with international actors for the management of protected areas in the country (Keller 2009). According to some scholars, power struggles between the Malagasy state and international conservation actors, and not conservation goals themselves, resulted in the criminalization of expanding the *jinja* fields into the forest, reducing independence and food security, and contributing to a local feeling that lands were taken away by powerful external forces for their own benefit (Keller 2015). In addition, the strategy followed by park authorities, of placing park agents in local villages, contributes to the perception of some residents of being permanently under surveillance (Keller 2009: 78).

Changes over time

The protection status of Masoala National Park has remained stable since establishment in 1997. However, the re-identification and marking of park boundaries, using paint to identify its physical delimitations, has resulted in highly problematic and controversial events during the last two decades. Paint locations shifted at each marking event, in most occasions enclosing additional village land. According to the park management, the incursion of marking toward community boundaries was due to inaccuracies during the initial marking of borders, when park staff feared community backlash and avoided marking land under cultivation. Nonetheless, the unannounced and non-negotiated later change in the location of border markings was perceived as park expansion and an encroachment on villages' land (Keller 2015: 124-27; 145).

Management of Masoala National Park is primarily driven by threats to its biodiversity (Andrianjara *et al.* 2013). While park managers concentrate much of their effort on monitoring and patrolling, as well as conservation education and awareness raising, local communities will be compelled to continue to unsustainably use resources until there are sufficient alternatives to such practices.

Outcomes

After being included in the UNESCO's World Heritage List in 2007 as part of the Rainforests of the Atsinanana site[3], Masoala has had annual evaluations according to the criteria of World Heritage, including assessments of deforestation, biodiversity value, threat level, and other indicators. Such evaluation is aligned with the IUCN's Integrated Management Effectiveness Tool (IMET), which concerns the planning, monitoring and evaluation of protected areas and directly support managers in the field and at national agencies. Besides such evaluations, several studies provide insights into some of the impacts of Masoala National Park on deforestation and biodiversity conservation, ecosystem services, food security, human-wildlife conflicts, and natural resources governance outcomes on the peninsula.

Masoala National Park has been doing relatively well in terms of reducing deforestation and biodiversity loss (Goodman *et al.* 2018: 776; Eklund *et al.* 2019). This allows it to continue to constitute a unique habitat for the wildlife within the park, and to provide essential ecosystem services to the communities that surround it, in the face of expanding habitat loss, food insecurity, and water challenges elsewhere nationally. However, its periphery continues losing forest at a significant rate (Goodman *et al.* 2018: 776), in some areas up to 1% a year on average in the last decade (Llopis *et al.* 2019:16), which broadly aligns with rates across Madagascar in the last decade (Vieilledent *et al.* 2018). Further, conservation prospects under expected climate change scenarios are worrisome, both reducing forests and increasing anthropogenic pressures. Without current conservation measures, the effects of climate change on forest cover, ecosystem integrity, biodiversity, and the ecosystems role in supporting local communities would be dire, threatening both the long-term viability of Madagascar's most endangered lemur species due to reduced habitat suitability, and the long-term health and food security of local communities (Morelli *et al.* 2019). In terms of biological diversity, habitat loss is happening at a slower rate within the park than in other national parks, allowing the park to serve as what may be the final refuge for many keystone endemic species (Morelli *et al.* 2019).

The park's effects on the local human population have been more complex, however. On the one hand, residents perceive that they depend on the park for its protection of forests that provide them with firewood, roofing materials, honey, timber for construction, medicinal plants, lands that are a key part of their ecological place and world views, and water essential for drinking and the irrigation of rice; services which residents believe would have decreased in availability had the park not been created and deforestation continued (Llopis *et al.* 2020: 13; Ormsby and Kaplin 2005: 160). However, the long-term assurance of these services does not replace the need for alternatives to clearing new land for agriculture. The inability for communities which border the park to acquire new *jinja* fields increased food insecurity, particularly in households which lack access to irrigated rice fields or cash crop production, and thus income with which to obtain food (Llopis *et al.* 2020: 9; Keller 2015).

Complicating the picture, populations living in the periphery of the park have experienced in recent years the effect of a price boom for vanilla, the most important cash crop in the area. In addition to the social

[3] https://whc.unesco.org/en/list/1257/

turmoil driven by the price boom (Zhu 2018), and while the relationship between the cultivation of this high-value crop and the protection of the forests still remains far from fully understood, there are indications that expansion of vanilla cultivation might be increasing pressure on the forests around the national park (Llopis *et al.* 2019).

Human-wildlife conflicts over poultry surrounding the park are a significant threat to extant endemic carnivores, including the *fosa* (*Cryptoprocta ferox*), a euplerid carnivoran (Borgerson 2015: 411). The park is one of the few national parks large enough to support a sufficient population of *fosa* (Murphy *et al.* 2018), yet an average of one *fosa* is eaten per year by every 17 households on the peninsula (Borgerson *et al.* 2019).

Illustrating the delicate governance context surrounding Masoala, is the illegal exploitation of rosewood (*Dalbergia* spp.), a protected precious wood genus, within the park's boundaries, whose extraction and exportation sharply increased during the last political crisis which struck the country from 2009-2014 (Randriamalala and Liu 2010). Some scholars have argued that high ranking politicians and elected officials have benefited from the exploitation and illicit trade of this precious wood, which primarily is shipped to China, with political implications that are long-lasting (Wilmé *et al*. 2020; Anonymous 2018). In addition to the direct impacts of illegal rosewood logging on Masoala's biodiversity, which prompted the park to be included in UNESCO's List of World Heritage Sites in Danger[4], this situation will likely negatively affect long-run conservation efforts with local communities.

Conclusions

Masoala National Park has successfully slowed forest loss, ensuring one of Madagascar's key biodiversity hotspots can continue to constitute a supportive habitat for endemic wildlife and provide essential ecosystem services to human populations. However, without other interventions, such ecosystem services are insufficient, and sustainable use of natural resources around the park might be unable to ensure the food security of the local communities reliant on this land for providing both agricultural (Llopis *et al.* 2021) and wild foods (Borgerson *et al.* 2019). Further, while the park ensures the continuation of forests which are central to local cosmology (Golden 2014), it also prevents the continuation of land clearing for *jinja*, which threatens the cultural identity of rice farmers bequeathed by their ancestors to assign additional value to land, passing it on to the next generation (Llopis *et al.* 2021; Keller 2015: 133-34). To address these long-lasting dilemmas, further efforts are needed to provide realistic and reliable alternatives to local communities to ensure that unsustainable use of natural resources does not undermine local well-being, and that benefits and burdens are distributed fairly among the many actors involved in the conservation of Masoala's unique biodiversity.

[4] https://whc.unesco.org/en/news/639

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Protected Area Case Study: Tarangire National Park, Tanzania

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Tarangire National Park (TNP) in northern Tanzania is illustrative of the challenges of protecting biodiversity within human landscapes. This case study presents an account of TNP's context, establishment, history, and outcomes.

Context

The larger Tarangire-Manyara region of East Africa is one the most biologically important and complex grassland savanna ecosystems on earth (Olson and Dinerstein, 1998). Part of the Maasai Steppe, it supports the second largest migration of large ungulates in East Africa, and one of the largest on earth (Lamprey, 1964, Kahurananga, 1981, Reid et al., 1998). TNP, which lies between the Amboseli/Kilimanjaro region to the east and Serengeti and Maasai Mara landscape to the west, protects the largest population of elephants (Loxodanta Africana) in northern Tanzania (Foley, 2006). The park also contains important dry-season water resources. Outside the park, especially to the north and east, wet-season grazing and calving areas are critical for migrating wildlife (Morrison and Bolger, 2014, Morrison et al., 2016) and livestock.

The areas including and around TNP comprise a portion of the historical territory of the Kisongo Maasai (Igoe and Brockington, 1999). Maasai livelihoods center on transhumant pastoralism, which is well adapted to this area's semi-arid climate and high rainfall-variability (Ellis and Swift, 1988, Homewood and Rodgers, 1991). In the past few decades, however, Maasai throughout East Africa have begun to settle more permanently (Fox et al., 2019) and adopt agriculture for various reasons (McCabe et al., 2010, Leslie and McCabe, 2013, Homewood et al., 2009, Baird and Leslie, 2013). Recently, many Maasai have adopted new technologies (Baird and Hartter, 2017, Summers et al., 2020) and new livelihood strategies including urban labor migration, local non-farm employment, and sharecropping, with consequent cultural shifts (Baird and Gray, 2014, McCabe et al., 2014). Coupled with this diversification of pastoral livelihoods is the continued fragmentation of rangelands which restricts the mobility of Maasai and their ability to access resources.

Changes to livelihoods and the rangeland must be viewed in the context of the political history of the region. Shortly after the British gained control the Tanganyika territory following World War I, the Land Ordinance of 1923 was enacted to define and regulate land tenure. Tanzania gained independence from Great Britain in 1961. And in 1967 it adopted the Arusha Declaration, which served as a foundation for the Ujamaa socialist development program. Beginning in 1974, millions of people were moved from ancestral lands and resettled elsewhere to facilitate the distribution of goods and services. Years later, in

1999, following a pivot back to capitalism, the Village Land Act recognized customary land tenure and allowed villages to manage village land and allocate individual plots to village members. Still, the Tanzanian government owns all land. Land users hold long-term leases (Veit, 2010).

Protected area establishment

During the colonial period, the large area between what is now Arusha and Babati was known for hunting, especially around the Tarangire River. The area west of the river was used by Dorobo hunter-gatherers, some fishers and agro-pastoral Gorowa and Mbugwe, and occasional Baribaig pastoralists. East of the river was predominantly Maasai.

Discussions of creating a protected area (PA) in this location began in the 1930s and grew more serious in the 1940s and 1950s. Officials were concerned that wildlife were being depleted in areas frequented by colonial hunters and guides, including Denys Finch-Hatton and Bror von Blixen. In 1957, a portion of the area that is now TNP was gazetted as a game reserve (GR) to help keep wildlife away from human populations. Maasai retained access to Silale swamp, a critical dry-season water resource and the boundaries of the game reserve were not strictly enforced.

This changed in June of 1970 with the creation of TNP, which encompassed a larger area including Silale swamp. As with other NPs in Africa, this was to create more permanent and strict protection modeled on US parks, and centered on the ideas of protecting nature for the national interest and generating tourism revenues (Adams, 2013). Local communities were not consulted. Maasai first learned about the park when a small plane landed and two white men speaking Swahili got out and told them this was now a NP and that they could no longer use it. Some recalled that aircraft also herded people and cattle out of the new park, while government staff burned shelters (Sachedina, 2008).

One author's local informants recalled that people continued to bring small stock to the swamps for years, but were afraid of white men and of what would happen if they were caught inside the park, which had started to maintain strict boundaries. Arlin (2011) and Igoe (2002) have argued that the alienation of Silale swamp was a considerable hardship for Maasai as they used this area for cattle as well as small stock, especially during droughts. Igoe (2002) reports that Maasai in Loiborserret were denied access to water within the park during the severe drought of 1993-94 and correspondingly suffered the loss of the majority of their cattle.

Decision-making, values & changes over time

TNP can be seen as an outcome of top-down decision-making and control by colonial and post-colonial administrators, whose values for wildlife protection and tourism revenue have been privileged over local communities' values, sustainable livelihoods and economic development. Changes over time, however, have reflected shifting awareness of the importance of community engagement and development for biodiversity protection. But many opportunities for improved park-community relations and more equitable governance remain.

The original GR was created by the British colonial government in modest consultation with local leaders. Maasai did not agree with the boundaries of the GR, but retained access to critical resources. Years later, TNP was created by the Tanzanian government. However, white post-colonial managers and ecologists continued to dominant the wildlife sector, which reflected their views and values.

Tarangire remains in IUCN management category II, and natural resource extraction by communities, including livestock grazing, is denied. It is governed by Tanzania National Parks Authority (TANAPA) who are responsible for enforcing the border, developing tourism, providing community support and conservation education (TANAPA, 2020). Recent management of the park and wider landscape has been driven by concerns that TNP is increasingly isolated and its wildlife under threat from agricultural expansion, especially to the east, in Simanjiro District (Borner, 1985, Mtui et al., 2017a). Outside the park, struggling local communities, have lobbied for greater support from TANAPA and other conservation-related organizations (Baird, 2014). These competing concerns have spurred community-based conservation (CBC) projects around the park and continued efforts to create wildlife corridors (Goldman, 2009).

In the 1980s, the idea of CBC rose in popularity in line with concepts of sustainable development, concern for social impacts of (PAs) and neoliberal ideology. During this period, it was also increasingly apparent that PAs in East Africa were failing (Stoner et al., 2007, Newmark, 1996). In the case of TNP, wildlife corridors were proposed to reduce the isolation of the park and improve connectivity of habitats, including a Simanjiro Conservation Area (proposed by Frankfurt Zoological Society). This was rejected by Maasai residents who feared eviction from their lands, and were steeled against conservation on the plains (Igoe, 2004).

In 1985 TANAPA set up a Community Conservation Service (CCS) termed Ujirani Mwema (Swahili for 'Good neighbourliness'), which comprised extension work with villages (Davis, 2011). From 1992 most funding went to 'Support for Community Initiated Projects' (SCIP) village-level social-development projects initiated by communities bordering TNP. These projects struggled to reduce hostility to the park, which has been driven by the loss of pastoral land and the continued impacts of living near wildlife (Kangwana and ole Mako, 1998).

The Wildlife Policy reforms in 1998 gave communities rights to manage and gain benefits from wildlife with the intention to contribute to poverty alleviation goals, a shift that was seen as donor-driven. This contrasted with CCS efforts in which communities were passive recipients of benefits from conservation. The resulting establishment of Wildlife Management Areas (WMAs) were largely resisted by communities around the park, with few exceptions, and have been criticized for sidelining indigenous knowledge and customary land management systems (Goldman, 2003, Bluwstein et al., 2016).

Since the late 1990s, arrangements between tourist companies and hunting outfitters provided some benefits to communities from wildlife (Baird, 2014). Income from photographic tourism and hunting contributed significant amounts to villages around TNP, but there were problems of corruption and elite capture (Sachedina, 2008). Since 2007, government policy has returned control over wildlife, as well as income from hunting and tourism, to the central government (Benjaminsen et al., 2013).

Although expansion of conservation around TNP has largely been resisted, one exception has been the establishment of the Simanjiro Conservation Easement in which NGOs and tourism companies have contributed approximately US$4500 per year to each village participating in the easement in exchange for not establishing settlements or cultivation on the designated land (Nelson et al., 2010).

Outcomes

Since the creation of TNP, several outcomes associated with TNP have been examined. Here we organize these into three broad categories: conservation, society and conflict. The studies discussed below were identified through a systematic Web of Science literature search on August 31, 2020 using the following search criteria for titles and abstracts: contains "Tarangire*" AND (outcome* OR impact* OR effect* OR conflict* OR poverty* OR social*).

Conservation

In some cases, researchers have collected data within the park for purely biological studies of multiple species and relationships. Many studies have examined issues related to giraffes, including: computer-assisted strategies for mark-recapture analysis (Bolger et al., 2012), the seasonality of survival probability and population growth rates (Lee et al., 2017, Lee et al., 2016a, Lee et al., 2016b), and the relationship between skin disease and soil fertility (Bond et al., 2016). Research has also focused on elephants, though fewer purely biological studies have been published. This work examined age/size-order hierarchies (Archie et al., 2006), and the protective effects of elephant dung for A. indica seeds (Spanbauer and Adler, 2015). Other studies have focused on: the courtship songs of orange-bellied parrots (Venuto et al., 2000), the prevalence of bovine tuberculosis (Cleaveland et al., 2005), nucleotide diversity in Tsetse flies (Marquez et al., 2006), the contributions of large savanna trees to wildebeest nutritional requirements (Ludwig et al., 2008), and spatial and seasonal variation in mixed mammal group assemblages (Kiffner et al., 2014)

Many more studies have examined the effect of TNP on conservation outcomes. From 1971 to 1996, total woody species density declined in two predominant savanna types within TNP. Declines, found specifically in shorter (<1m) and taller (>5m) species (method?), were partially attributed to severe drought (in year?) (Van de Vijver et al., 1999). More recently, remote-sensing analyses of land cover change over 27 years found declines in woody savanna and increases in swamps and barren land inside and outside TNP (Mtui et al., 2017b). Researchers have also examined the effect of low dry-season-range forage quality during wet months to explain observed decreases in migratory ungulate populations, with findings highlighting the importance of protecting wet season ranges (Voeten et al., 2010).

Prior to 1993, elephants in TNP were affected by heavy poaching (Foley and Faust, 2010). To better examine these effects and other causes of social disruption, researchers have shown how progesterone and cortisol metabolites in feces can provide indices of reproductive function and physiological stress (Foley et al., 2001). Using behavioral and genetic data from 1998-2001, researchers found that, of the bulls that remained from poaching, the oldest performed most matings and fathered the majority of infants (Ishengoma et al., 2008). Analysis of data from 668 individually known elephants in 27 family

groups tracked between 1993 and 2005 showed a large increase in population with a growth rate that approached the maximal rate for African elephants (Foley and Faust, 2010). Consistent with these findings, long-term aerial surveys of five elephant transit corridors between TNP and northern and southeastern wet-season dispersal areas have been stable since the 1960s (Pittiglio et al., 2012).

The bulk of conservation research in and around TNP has examined mammal species richness and abundance across a range of land-uses. Pastoralist areas specifically, have been found to have richness levels equivalent to, or higher than, TNP and higher than settled and cultivated areas (Msuha et al., 2012, Kiffner et al., 2015b). And a comparison of livestock and mammal densities in two wildlife corridors found better conservation outcomes in pastoralist-managed areas compared to game-controlled areas (Kiffner et al., 2016). A similar study showed that giraffe home range was unrelated to pastoralist settlement, suggesting that giraffes are tolerant of pastoralist land use (Knusel et al., 2019).

Research on mammals has also examined other forms of human-managed areas. North of TNP, a WMA was found to have greater density of giraffes and dik-diks, and lower livestock densities than a control area (Lee and Bond, 2018). Carnivore occurrence was shown to vary by land-type, with lion occurrence negatively associated with distance to TNP and hyena occurrence positively associated with human population density (Mkonyi et al., 2018). Roadkill was found to be greater on roads adjacent to the park compared to non-adjacent roads (Kioko et al., 2015). And Tse-tse fly abundance showed mixed associations with wildlife and livestock abundances (Ngonyoka et al., 2017).

But population trends for ten species in TNP and two human-dominated areas were mainly stable between 2011-2018, even while trends in Manyara NP declined (Kiffner et al., 2020a), prompting researchers to argue that CBC models can support mammal communities just as well as parks (Kiffner et al., 2020b). That areas used by Maasai outside the park are successful in supporting wildlife populations, highlights the need for engagement with local communities and wider landscape governance.

Society

“Proximity to park” has been a common variable used to evaluate social outcomes associated with TNP. A survey of households east of the park found proximity associated with livelihood diversification but not income, suggesting that pastoralists are adapting to disturbance-related opportunities and constraints (Baird and Leslie, 2013). Similarly, financial pathways to support water and education infrastructure were found to be more diverse near the park, corresponding with greater investment and higher measures of school enrollment (Baird, 2014). A comparative study of TNP and Kibale NP in Uganda found that ethnic diversity, along with population density and poverty near the parks varied spatially in ways that suggest that management strategies should as well (Mackenzie et al., 2014). Vaccine efficacy for East Coast Fever was also found to be associated with distance from TNP and post-vaccine duration (Kazungu et al., 2015).

Social institutions like religion, women’s programs, and wellbeing have also been foci of social scientists. A mixed qualitative and survey-based study in communities adjacent to the park found that church messaging related to family planning, education and land-use was consistent with common conservation-related goals to limit population growth, promote local development and encourage certain land-uses

over others (Baird, 2015). Drought was found to have mixed effects on tourism proceeds to Maasai women's groups near TNP with increases in collaborative external links, but decreases in the production and distribution of handicrafts (Lwoga and Asubisye, 2018). And an inclusive study of wellbeing, focused on material, relational and subjective components, found that respondents diverse concerns centered around future security, especially regarding issues of land (Woodhouse and McCabe, 2018).

A survey conducted in 2006 found that contrasting land tenure policies around TNP and other Maasai areas were associated with variation in demography and livelihood diversification, though the effects of conservation on these social outcomes were unclear (Nkedianye et al., 2020). And recent comparisons of TNP and Mole NP in Ghana show that a minority, and much lower percentage, of respondents around TNP view the park as having a positive impact on their lives (Abukari and Mwalyosi, 2020), perceptions which are mediated by household, economic and spatial attributes (Abukari and Mwalyosi, 2018a).

Some scholarship has focused on anthropocentric ecosystem services, specifically on the eastern border of the TNP. Nelson et al (2010) reported on how a consortium of tourism operators began paying local communities to preserve communal grazing lands, which both livestock and wildlife use, by preventing crop-based agriculture in those areas. Related studies of dry-season and drought resource areas, critical for Maasai livestock, have found that conservation and agriculture each reduce these areas (Miller et al., 2014, Miller, 2015). And a broad survey of households near TNP found that they place greater value on forest products than wildlife resources (Abukari and Mwalyosi, 2018b).

Conflict

Since the early 1990s, survey-based studies have focused on human-wildlife conflict and related tensions near TNP. Early studies of communities near PAs across Tanzania, including TNP, showed that while a minority opposed abolishing the local PA and viewed poaching as illegal, nearly half of respondents reported negative perceptions of parks and park officials (Newmark et al., 1993). In a related study, a strong majority of people living near Tanzanian PAs reported conflict with wildlife, including crop damage and livestock depredation, with large animals especially troublesome at low human densities and small animals problematic at high densities (Newmark et al., 1994).

Qualitative studies of community-based conservation efforts around TNP have found that indigenous knowledge has been poorly incorporated in planning efforts (Goldman, 2003) and that wildlife corridors are unpopular with local communities (Goldman, 2009). And mixed qualitative and survey-based research found that proximity to TNP was significantly associated with perception of park-expansion as a serious risk to livelihoods (Baird et al., 2009), an indication of eroding support for conservation (Baird, 2013).

In the area around northern TNP, a large survey of households found that approximately one third consumed bushmeat (Kiffner et al., 2015a). Consumption was not associated with alternative proteins or wealth, but Maasai were less likely than non-Maasai to consume. A large survey of human-carnivore conflict showed few consistent associations between social factors and conflict occurrence with five species, though non-economic factors were more important drivers than economic ones (Koziarski et al., 2016).

Technology has been found to ameliorate the negative impacts of wildlife on local people. East of TNP, a mixed qualitative and quantitative study found that people use mobile phones to manage human-wildlife conflict, some species more than others (Lewis et al., 2016). Another study reported on the successful use of drones to haze elephants away from agricultural fields and settlements around TNP and Serengeti NP (Hahn et al., 2017). Also, more traditional strategies, including fortification of livestock enclosures, and use of adult-herders and domestic dogs, were found to be effective against carnivore predation according to a large survey-based study (Mkonyi et al., 2017).

Summary

While people living near TNP have experienced some positive social outcomes such as development opportunities and infrastructure, they continue to experience the negative impacts of living in close proximity to wildlife, and hold negative perceptions of TNP, which are rooted in a history of land fragmentation and alienation, and exclusion from decision-making processes. Given prevailing patterns of social stratification within these communities, the burdens associated with living near TNP are not distributed equally, with women suffering disproportionately (Summers et al., 2020, Smith, 2015). Furthermore, traditional institutions of risk-spreading, reciprocity and trust are declining as Maasai diversify their livelihoods (Baird and Gray, 2014) in response partially to perceived risks of park expansion. And while access to land remains central to local perceptions of wellbeing (Woodhouse and McCabe, 2018), an evolving transition away from traditional, informal governance structures towards more formal, village-based authority may be undermining pastoralists' resilience to drought (McCabe et al., 2020) and the landscapes humans and wildlife share, often successfully.

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Protected Area Case Study: Jozani-Chawaka Bay Conservation Area, Tanzania

Fred Saunders

In 2004, Jozani-Chawaka Bay Conservation Area (JCBCA) in Zanzibar, Tanzania formally came into being as a response to valuable habitats and endangered species coming under threat from population growth linked to unsustainable, market-oriented forest resource use (by local actors) driven by poverty (Saunders 2011). There was a wide range of key actors involved in planning and funding the project, including NGO, CARE International (and related donors), Wildlife Conservation Society (WCS), the World Bank (IUCN via the GEF and backed by a several notable international donors), through the UNEP and the Government of Zanzibar (multiple sectors). More broadly during the 1990s and early 2000s, Zanzibar was actively looking to restructure its economy and development prospects by adopting a mixed bag of state, private, and community-based conservation regulations softened by tourism development opportunities (Levine, 2007). The JCBCA consists of Jozani-Chawka Bay National Park as a core area (5,600ha), surrounded by a buffer zone of eight community-managed areas or shehias (wards) (8,000ha), together these two areas with different, but interrelated governance arrangements, conform to a model integrated development and conservation project. In 2016, UNESCO designated the Jozani–Chwaka Bay Biosphere Reserve (JCBBR), which expanded the area even further, covering 21,274 ha, including ten shehias with a resident population of 16,500 people (UNESCO MAB ICC, 2016; Carius & Job 2019). While it is difficult to find studies that show the wealth or income profile of those in the area, Faki & Akarro 2016 report that a 2010 HBS report showed that 61% of Zanzibar people live below the 'basic needs poverty line' and 22% live below food poverty line with limited access to electricity in the JCBCA.

Several distinct habitats were included in the JCBCA (now expanded to the JCBBR) including mangroves, groundwater forest, ever green mixed forest, coral rag forest, salt marsh, mangrove forest and sea grass beds (Nahonyo et a. 2002). The area is home to populations of endangered (and endemic) Zanzibar red colobus monkey (*Piliocolobus kirkii*), the Aders' duiker (*Cephalophus adersi*) and the Zanzibar servaline genet (*Genetta servalina archeri*). Other species of fauna found in the park are the Sykes monkey (*Cercopithecus mitis albogularis*), bush babies, more than 50 species of butterfly and 40 species of birds[5] (UNESCO 2019; Salum 2009). The trend in the reduction over a long-period of time of the red colobus monkey, considered to be a Zanzibari flagship conservation species, was particularly concerning (Struhsaker and Siex 1998). The area is recognized as an important part of the Eastern Arc and Coastal Forest System (and Centre of Endemism in East Africa), and so recognized among the World's 25 Global Hot Spots (WWF-US 2003; Nahonyo et al. 2002).

[5] And formerly the zanzibar leopard (*Panthera pardus adersi*), which is thought to be extinct

The overarching aim of the JCBCA (which is relatively unchanged with the JCBBR status) is to establish positive synergies between conservation, community-based management, promote 'alternative' non-timber forest resource use (e.g. bee-keeping, handicrafts for tourists) and (benefit-sharing from) tourism development in the area, formally stated as 'Through community participation, conserve, protect and develop the JCBNP. The goal is to restore and sustain the park biodiversity and to improve economical, social, cultural and environmental benefits for the present and future generations.' (JCBNP Management Plan 2001). In the JCBNP, strict protected area rules apply, which are enforced by paid parks staff, whereas, in the buffer area surrounding the national park, several Village Conservation Councils (VCC) were established to work with CARE and the parks agency to establish Resource User Management Agreements (RUMA) – so community-based enforcement occurs in the buffer zone area. The aim of establishing RUMAs is to formalize village-based by-laws to regulate land/resource use activities in the Park's buffer zones. The Jozani Environmental Conservation Association (JECA), which includes representatives from villages in the buffer zone and as well as a host of technical support representatives was set-up to provide a conduit between Parks and the villages to oversee the work of the eight VCCs (and later to disperse Park revenue according to a yet to be agreed upon (with CARE and the Department of Commercial Crops, Fruits and Forestry (DCCFF) distribution scheme, discussed below. Also, as a part of the effort to facilitate access to capital to support 'alternative development' opportunities in 1999, when CARE together with DCCFF, introduced the informal microfinance system known as Village Saving and Credits Associations (VSLA) (Faki & Akarro 2016).

Prior to establishing the JCBCA, there had been several historical enclosures of customary land and resources in the area, including in 1948, the British colonial government establishing the Jozani Forest Reserve (1,712 ha), which was subsequently formalized in 1960 and expanded by 2,500 ha in 1984. The former Chwaka Bay Forest Reserve (1,848 ha), established in the 1950s, also lies within the current JCBNP boundaries. These previous expropriations of community land, fed into feelings of distrust among local residents towards the JCBNP, who were concerned about further erosion of customary rights to land and resources from the outset of park planning in the 1990s (Chachage 2000; Saunders 2011). A key contention in the local negotiation over establishing the Park revolved around a revenue sharing agreement that would be used to support village infrastructure as well as direct compensation to individual farmers whose land was to be enclosed within the Park boundaries. As part of this arrangement, regular payments to villagers were to be funded from visitor entrance fee revenue to the Park. A key concern held by local farmers concerning the establishment of the JCBCA (inclusive of the park and buffer zone) was that greater protection of the red colobus monkeys would mean more damage (through browsing and mechanically, through movement) to important local crops such as coconuts, cassava and bananas (Saunders 2011). According to studies by Struhsaker and Siex undertaken in the 1990s, the highest density of red colobus (550 individuals/km^2) was recorded on farms (Shambas) adjoining JCBNP (Siex and Struhsaker 1998; 1999). There are differences between the estimates of the population of red colobus. At the time, the total population of Red colobus in the Park was estimated to be 1,500 individuals (Mturi 1991), while Struhsaker & Siex (1996) put the number on Zanzibar more widely at 1,500-2,000 individuals. There were accounts of locals scaring and even shooting red colobus when seen in shambas (or agricultural fields). Faki & Akarro (2016) also report more recently on resource conflicts in the area. So, the nub of the dispute was a claim by farmers for compensation because of crop damage caused by

the increasingly protected red colobus monkey population, which was highly valued both as an endangered species and as an iconic tourism attraction. A study by Siex and Struhsaker (1998) carried out during the planning phase of the Jozani project refuted the farmers' claim of a link between red colobus monkey browsing and smaller yields from coconut trees (an important local agricultural crop). This research finding subsequently influenced the DCCFF's position on the distribution of the benefit-sharing arrangement, i.e., red colobus monkeys do not harm farmers' crops (Saunders 2012). An overarching ambition of the Jozani-Chawka ICDP, therefore, was to reconstruct the ongoing perception that local farmers had of the red colobus as crop pests to see the monkeys as species of conservation and local and national social and economic value.

There have been a few studies which have examined community participatory practice in JCBCA. These studies have tended to describe the formal design of governance arrangements and then presume from these that communities (and heterogenous actors within them) are adequately represented and can in fact meaningfully influence outcomes in their interests. While there are numerous locally-rooted participatory forums that form the governance arrangements of the JCBCA area (see Saunders 201l; Carius & Job 2019 for descriptions), it is not clear to what extent different local communities have and are able to meaningfully influence development and conservation initiatives to support significantly improved livelihood opportunities. Recent studies (see Carius & Job 2019; Muslim and Hassan 2019) suggest that capacity to benefit from park related tourism (beyond the benefit sharing arrangement) is limited because of infrastructure and capacity shortfalls among communities living in the areas bordering the park. This indicates that while the JCBCA governance arrangements, which are shared between the local civil society and government institutions, offer a form of collaborative management, it is not evident that this arrangement been empowering (within the framing of the ICDP) - to the extent that through these mechanisms improved local economic and wellbeing has been realized. In fact, a relatively recent study by Zella Adili et al. (2017), described how resource conflicts in the management of biodiversity in JCBCA are still common – which may indicate both a lingering lack of acceptance of the conservation arrangements and relatedly a lack of realized livelihood benefits.

While there are different views around how beneficial the revenue-sharing arrangement results of the JCBNP has been to local communities, a common criticism has been that tourism revenue mostly benefits the communities as a whole, rather than the individual households that directly suffer the effects of crop damage or have their use of the forest constrained. The 50/50% tourism revenue sharing between government and civil society institutions appears to be generous (relative to other like schemes), but there are concerns that generating alternative income streams at household level have been limited for a variety of reasons, including lack of tourism infrastructure, lack of viable economic alternatives, shortage of start-up capital (despite the establishment of the VSLA), lack of required competencies etc. Carius & Job (2019) report that during the fiscal year, July 2017-June2018, JCBNP attracted ca. 60,000 visitors, which generated 1,039,263,478 TZS (c.a. 447,000 US) (Carius & Job 2019) over the year. Fifty percent of this revenue was allocated to community institutions in support of farmer compensation (30%), effective representation in park governance arrangements (4%), Pete village for its Mangroves Boardwalk fund (8%), with the remainder (8%) is allocated to the community development fund (CDF). This breakdown shows that while the CDF does contribute positively to local service delivery such as education and health

and water supply (arguably substituting for unprovided government services), it constitutes a relatively small share of the overall benefit sharing allocation – 41,572,794 TZS (or ca. 17,880 US) (Muslim and Hassan 2019). So, while the benefit sharing arrangement appears progressive and does provide tangible collective benefits, it is not clear whether the amount of revenue shared (and how it is directed) is sufficient to compensate local communities for the costs of conservation. Furthermore there is little evidence that shows that villages in the buffer zone, since the inception of the Park, have shifted/built capacity to enable them to realize social and economic benefits from rural tourism and tourism development. More generally in Zanzibar, Anderson (2013) discusses the problem of tourism leakages caused by little local investment in tourism infrastructure, local participation in tourism restricted to low paying positions and the lack of local supply of tourism input supply chains (such as food etc.).

It is difficult to gauge the effects of the JCBNP on a wide range of ecological values that the park and surrounding area hosts, so here I focus on the red colobus population numbers (as perhaps the central development and conservation figure in this setting). Although there is uncertainty about red colobus numbers before and after the establishment of the JCBCA, the balance of available evidence suggests that red colobus numbers have increased both in the park area and on Zanzibar more widely. A recent study puts these numbers at 2,907 in the Park and 5,862 on Zanzibar more widely (Davenport et al. 2019). It is hard to make decisive judgements about the reasons why numbers have increased, but it has been speculated that factors such as the collaborative governance arrangements, revenue sharing and/or acceptance of nature conservation measures have had effects (Carius & Job 2019; Davenport et al. 2019).

This brief review of JCBCA (including JCBNP and extending to the more recent JCBBR) shows that collaborative governance forums have been established to share decision-making among local communities and between communities and government. There have also been agreements reached on benefit sharing and indeed distribution to surrounding communities of park related revenue, but what is still not clear is whether communities' economic prospects have significantly improved since the inception of the Park in 2004. Generation of 'alternative income' (as a means to move away from small-scale agriculture and extraction of timber, seen to be antipathetic to conservation goals) seems to have been limited to handicraft and bee-keeping enterprises of relatively minor income importance (This assessment must be made with some reservation given that there has been no systematic comparative (before and after) studies and given this we have no reliable baselines to refer back to). That said, the partnerships established at JCBCA show promise, if structural obstacles that are inhibiting more meaningful and lucrative engagement in tourism and alternative income related activities can be overcome. However, further unfettered tourism growth, rather than a restructuring of tourism benefits, may work to undermine the very social and environmental values and experiences that attract visitors to Zanzibar.

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Protected Area Case Study: Raja Ampat Marine Reserve, Indonesia

The path towards more equitable social and ecological outcomes of area based conservation: a case study showcasing the incorporation of diverse values in establishing, implementing, and managing MPAs in Raja Ampat, Indonesia

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Context

Raja Ampat marine protected area (MPA) network, located in Eastern Indonesia, has been widely recognized as a successful conservation effort that has led to the establishment and implementation of several co-managed multi-use MPAs. The Raja Ampat MPAs are nested within the Bird's Head Seascape (BHS), an extensive epicenter for marine biodiversity and conservation priority in West Papua (Mangubhai et al. 2012; Ahmadia et al. 2017). Raja Ampat's MPA network, which includes four MPAs covering nine distinct areas, covers 1,880,098 ha of coral reef habitat and associated small islands (Purwanto et al. 2021*)*, of the region's 4.5 million ha (Agostini et al. 2012). At the heart of this network is *Taman Wisata Perairan* (TWP; Aquatic Park) Raja Ampat, a multiple use marine protected area established under authority of *Kementerian Kelautan dan Perikanan*, Indonesia's Ministry of Marine Affairs and Fisheries (MMAF).

Although a single MPA legally, TWP Raja Ampat is comprised of six discrete areas: Ayau-Asia Islands, Dampier Strait, Fam Islands, Kofiau and Boo Islands, Mayalibit Bay, and Southeast Misool, which cover 1,355,000 ha alone, containing the majority of marine protection in Raja Ampat (Purwanto et al. 2021). In addition to TWP Raja Ampat there are also two *Suaka Alam Perairan* (SAP; Water Reserves): SAP West Waigeo and SAP Raja Ampat Islands, as well as a community-governed MPA under initiation -- *Kawasan Konservasi Perairan Daerah* (KKPD; Provincial MPA) North Misool, considered as part of the network (Purwanto et al. 2021).

This epicenter of global marine biodiversity and cultural diversity was highly threatened by human pressures in the 1990s and early 2000s, jeopardizing reef ecosystems and the local people who depended on those resources. In response, NGOs worked with the local communities and local government to establish this network of co-managed multiple use MPAs that give preferential use rights to locals, exclude outsiders, and prohibit destructive fishing methods. This co-management system is built upon long

standing customary tenure regimes, notably *sasi*. Raja Ampat MPAs reflect a diversity of values held by these different stakeholder groups, including biodiversity conservation, sustainable fisheries, ecotourism, Papuan culture, and traditional livelihoods held by the Indonesian government, NGOs, and local communities. Since their establishment, rigorous evaluative systems demonstrate that the MPAs -- through direct and indirect pathways -- have enabled sustainable fishing and tourism practices, improved human well-being, and have maintained or increased coral cover and fish species in the network overall. This case illustrates the potential for indigenous peoples and other local communities to steward their lands and waters effectively, especially where governments and NGOs provide financial, technical, and legal support to local residents.

Ecological context

Raja Ampat harbors over 75% of the world's scleractinian coral species across several reefscapes- more than 550 species- making it the most species-rich marine ecoregion anywhere (Donnelly et al. 2003; Devantier and Allen 2009; Huffard et al. 2012; Mangubhai et al. 2012). Other diverse habitats include mangrove forests, karst channels, seagrass beds, mesophotic coral ecosystems, deep sea features, and an abundance of marine lakes (Huffard et al. 2012; Mangubhai et al. 2012; Andradi-Brown et al. 2020). The archipelago also boasts a high number of reef fish species: at least 1,427 have been observed (Allen and Erdmann 2009; Agostini et al. 2012; Andradi-Brown et al. 2020). Raja Ampat is an important area for marine megafauna as well: nesting and foraging for green and hawksbill sea turtles (Donnelly et al. 2003), and likely a migratory and breeding ground for marine mammals, with 17 cetacean species and dugongs observed in the region (Huffard et al. 2012). The government decreed Raja Ampat as a shark and ray sanctuary in 2010, the first of its kind in the Coral Triangle (Ahmadia et al. 2017).

Social/Economic context

The archipelago, consisting of four main islands for which it is named (Waigeo, Batanta, Salawati, and Misool), is sparsely populated (roughly 50,000 people as of 2018; BPS 2018), but culturally diverse, which has led to customary ownership and marine tenure conflicts, stemming from arguments on indigeneity (Donnelly et al. 2003; Grantham et al. 2013). While participation in the cash economy is increasing, the majority of the population still rely on subsistence economies, with village communities dependent on coastal resources, particularly fishing, for food and local income (Donnelly et al. 2003; Agostini et al. 2012). Customary tenure rules are similar to those elsewhere in the wider Pacific (Donnelly et al. 2003).

Marine resources have contributed to the local economy through commercial and small-scale fisheries, tourism, mariculture (pearl and seaweed farming), oil and gas, mining, and logging (Grantham et al. 2013). Challenges associated with economic growth in recent decades include population growth from transmigration, development for poverty alleviation, and exploitative practices (Agostini et al. 2012). Destructive fishing practices were widespread in Raja Ampat, becoming prevalent in the 1980s-2000s, including illegal, unregulated, and unreported (IUU) fishing, where in 2006 alone IUU catch exceeded reported catch by a factor of 1.5, valued at USD 40M (Varkey et al. 2010); pressure on fish spawning aggregations for commercially important species by the live reef food fish trade, if unchecked by governance or traditional management (Wilson et al. 2010); shark finning for a lucrative Chinese market

(Jaiteh et al. 2016; 2017); and blast and cyanide fishing as well as certain land-based activities (Donnelly et al. 2003; Varkey et al. 2010), leading to conflict over said resources as well as declines in fish stocks. This exploitation occured legally and illegally, with the latter usually conducted by "outsiders" (Donnelly et al. 2003; Agostini et al. 2012). The need to rectify these declines and conflicts, in addition to recognition of the area's biodiversity and opportunity for tourism, drove the creation of the MPA network and since its creation, and the more recent Manokwari Declaration (Cámara-Leret et al. 2019), progress in mitigating these threats has been made.

Governance

MPAs in Indonesia are regulated nationally by MMAF or the Ministry of Environment and Forestry. TWP Raja Ampat and all other MPAs in Raja Ampat lie under MMAF authority. However, MMAF MPAs can have decentralized governance or be managed nationally - with two MPAs in Raja Ampat (SAP Raja Ampat Islands and SAP West Waigeo) under national jurisdiction. Other Raja Ampat MPAs, including TWP Raja Ampat, were established under decentralized MMAF governance, by the MMAF office within the Raja Ampat Regency government. These locations were first established by Papuan communities with tenure under traditional *adat* law, after which MMAF declared them as formal MPAs (Mangubhai et al. 2012). KKPD North Misool is directly under the West Papua provincial government, though community-managed. In 2014, new national regulations were passed (UU No. 23 Tahun 2014) transferring management of coastal areas from regency governments to provincial governments, granting the latter control of 0-12 nautical miles from shore, thereby shifting management of TWP Raja Ampat to the provincial government.

Establishment

Raja Ampat became a high priority target for marine conservation after coral reef research in 2001 and 2002 showcased the region's high biodiversity. Its MPAs were established as a response to the original goal of the BHS Initiative, a conservation program led by NGOs jointly with government, local universities, and key stakeholders: to effectively manage coastal resources in a sustainable manner that incorporates principles of ecosystem-based management to protect its wealth of biodiversity, while supporting livelihoods for Papuans and ensuring equitable benefit sharing for local citizens.

The Raja Ampat MPAs were established via a "bottom-up" approach through customary community and regency laws (Mangubhai et al. 2012; Boli et al. 2014), with local communities keen to increase marine protection, to reinforce their tenure claims, and to codify preferential access to marine resources. As mentioned above, the MPAs, including regulations and zoning, were declared as part of a commitment by *adat* traditional law, and formally established to achieve similar outcomes. Due to large numbers of outside fishers (Donnelly et al. 2003), there was significant local support for MPAs to combat perceived threats. This led to a community leaders' agreement that was signed in Kofiau in 2006 which designated boundaries of marine waters to be protected and declared a partial transfer of customary rights from communities to be managed by the regency government (Atmodjo et al. 2019), rendering the initiation of the MPA network. Local communities and government are continuing to work together to help ensure sustainable fishing and reduce extraction from outside pressure.

The Regency originally designated a network of six multiple use MPAs (Ayau-Asia Islands, Dampier Strait, Kofiau and Boo Islands, Mayalibit Bay, Southeast Misool, and Kawe) initiated in 2001 and established in 2006, in addition to an already existing MPA (SAP Raja Ampat Islands) covering 835,210 ha (Agostini et al. 2012; Purwanto et al. 2021). The two SAPs, Raja Ampat Islands and West Waigeo (what was previously Kawe), were then officially established in 2009 at national-level status under MMAF's jurisdiction; Raja Ampat Islands had previously been managed by the National Department of Forestry and Conservation (Agostini et al. 2012). Also at this time the boundaries of three MPAs (Dampier Strait, Mayalibit Bay, and Southeast Misool) were expanded through a head of government decree (*Peraturan Bupati* No.5/2009), increasing the total area covered to 1,185,940 ha (Agostini et al. 2012). Fam Islands MPA was the last to be established as part of the TWP MPA, in 2017, in addition to the inclusion of KKPD North Misool, the community-managed MPA, initiated in 2016, for a total of 1,880,098 ha (Purwanto et al. 2021). These protected areas can also be referred to as two broad locations: North Raja Ampat, which consists of Ayau-Asia Islands, Dampier Strait, Mayalibit Bay, Raja Ampat Islands, and West Waigeo, and South Raja Ampat, which includes Fam Islands, Kofiau and Boo Islands, North Misool, and Southeast Misool (Purwanto et al. 2021).

In 2010, the Regency government, with support from NGOs (particularly Conservation International and The Nature Conservancy), began to initiate marine spatial planning. Socioeconomic considerations strongly influenced not only the MPA network itself, but also the design of the final zoning plans, using decision support tools and incorporation of non-spatial information from experts, stakeholders, and local communities (Mangubhai et al. 2015). The final zoning plans not only met recommended guidelines for resilient MPAs but also recognized community use and governance of resources, in terms of access and better support for long-term food security and livelihoods of local people (Mangubhai et al. 2015). Boli et al. (2014) categorizes conservation management in Raja Ampat into marine nature reserves, traditional management such as *sasi*, and marine conservation areas—the established MPAs. The latter can have up to six zones: a core zone, food safety and marine tourism zone, sustainable fishing and aquaculture zone, ship cruise lines zone, traditional management/*sasi* zone, and an "other use" zone (Boli et al. 2014; Ford et al. 2020, *in press*). Most of the zoning configurations and inputs considered in planning as noted by Agostini et al. (2012) and Grantham et al. (2013) use the two foundational zone types—sustainable fishing zones and no-take zones—to achieve the dual fisheries and biodiversity objectives, with the exception being when there is conflict between objectives or past decisions (e.g. the establishment of Misool Eco Resort).

Management and decision-making

In building this MPA Network, NGOs and spatial management experts compiled and convened stakeholder input and dialogue from local community members, MPA practitioners, local government, local businesses, and NGOs, across a range of technical workshops and formal and informal meetings, including multiple years of extensive community consultation in every village in Raja Ampat. For South Raja Ampat, the process included community participatory mapping based on local knowledge of locations of habitats, species, and specific uses and activities such as local fishing grounds. The process also included objective and goal development, such as priority areas for conservation and fishing, and zone design, with feedback

incorporated into the decision-support tools (Agostini et al. 2012). These tools, which not only reflect the range of values of stakeholders, but also provide transparency in the decision-making process, include habitat, species, uses, and threat maps as well as a zoning scenario analysis, which allowed for further public engagement and appreciation for Raja Ampat's ecosystem services (Agostini et al. 2012). For North Raja Ampat, zonation was put in place not with the help of these tools, but an even more extensive community negotiation process. Final decisions on MPA design, including zoning and regulations were first made by traditional *Adat* councils in each location before being formally adopted by the government.

The MPA network has been institutionalized under a quasi-governmental co-management body and framework called the Regional Public Service Body (*Unit Pelaksana Teknis Daerah-Badan Layanan Umum Daerah*, UPTD-BLUD), also known as the Regional Technical Implementation Unit (RTIU) under MMAF by *Peraturan Bupati* No. 7/2011 (Boli et al. 2014; Purwanto et al 2020, *in review*). This includes a division of administration and units of management, monitoring, and control for each area within TWP Raja Ampat, as well as a special task force (Boli et al. 2014).

This model provides two major benefits compared to traditional Indonesian governance of MPAs: the management authority can manage its own finances, including governmental budget allocations and grants, as well as any revenues generated (e.g. tourism entrance fees), and it allows non-government partners to participate in management and private individuals to be recruited as MPA staff (Mangubhai et al. 2012; Purwanto et al. 2021). The latter ability includes employing community members for MPA patrolling (Boli et al. 2014; Purwanto et al. 2020 *in review)*. The UPTD-BLUD structure has remained intact since the transfer of coastal management to the provinces with minimal disruption and remains a nimble entity designed for efficient decision-making.

Influence of sasi

Sasi laut (marine *sasi*) has had an important role to play in supporting conservation and MPA establishment in Raja Ampat. This traditional system of natural resource management encompasses specific rules and regulations governing fishing according to area access, harvest rules, gear types, and target species (McLeod et al. 2009; Satria and Adhuri, 2010). This can provide fair and equal access to resources, sustainable management of marine species, subsistence provisions, and a stable income (Thornburn 2000; McLeod et al. 2009). In Raja Ampat, *sasi*'s relevance is still apparent as a component of marine resource conservation; when reinforced by modern institutions and local law, sasi can help enhance local communities' resilience during times of social, cultural, and economic change (McLeod et al. 2009).

The MPA network's management authorities value *sasi* as a versatile practice that can survive certain changes (e.g. power structures, economic opportunities) and adapt to new opportunities and values, as well as ensure that local values and power structures are reflected in MPA management strategies (McLeod et al. 2009). Also, villages who practice *sasi* coupled with modern marine management strategies are more active in marine resource management, particularly where it has been supported by religion, governments, and NGOs (McLeod et al. 2009). Gunaisah et al. (2016) found that fishermen perceived *sasi*

as an integral part of their daily lives, given its association with cultural identity and local wisdom, in addition to ecological and socio-economic impacts

Influence of tourism

Tourism has been one of the greatest enabling factors for effective management of the MPA system, since Raja Ampat has become a marine tourism hotspot and as a result provided significant revenue, with development encouraged by the government. Enabled by increased investment in tourism infrastructure and marketing, tourism has rapidly expanded: visitors increased from roughly 1,000 to 24,000 (international) and 50 to 3,000 (domestic) for 2007-2019 (Purwanto et al. 2021). Registered scuba diving live-aboard boat numbers have also increased in the Regency, now capped at 30 vessels by local decree. As of 2017, roughly 11 resorts and 40 home-stays were in operation (Atmodjo et al. 2019). Like management of the MPAs themselves, managing tourism has evolved into a co-management strategy, driven by NGOs and local communities to support the network in a technical and financial capacity (Atmodjo et al. 2019) with needs to address social change, infrastructure, equitable distribution of benefits, and managing pressures on the ecosystems as a result.

In 2009, the Regency established an entrance fee system, or “ecosystem service stewardship fee” for tourists, with the income split three ways: (i) 30% of international tourist and 15% domestic tourist revenue goes to general revenue for the Regency; (ii) the remainder goes to UPTD-BLUD for the management of the MPA network operational costs; and (iii) from the latter IDR 1.5B is deducted annually for a community fund; this fund is allocated to local organizations and communities based on proposal submissions (Atmodjo et al. 2017). In 2019, the UPTD-BLUD received more than USD 1.41M from this entrance fee, which used these funds for MPA management and operating costs, including hiring over 100 local staff (Purwanto et al. 2021). Thus, Raja Ampat’s co-management strategy crosses several sectors for supporting the MPA network.

Outcomes

The Raja Ampat MPA Network has a large scale monitoring program supported by the local government, academic partners, and NGOs, that tracks management progress and changes in social and ecological conditions. In addition to ambient monitoring, a rigorous impact evaluation monitoring program designed and implemented to assess the social and ecological impacts of the MPAs, has been carried out in the BHS since 2008 (Pakiding et al. 2019). The program measures impacts on coral reef conditions in nine MPAs and impacts on human well-being in eight MPAs across the Seascape. Results below summarize findings for the most recent data available, as monitoring is still ongoing.

Ecological Outcomes

For Raja Ampat specifically, ecological monitoring focused on six MPAs (Ayau-Asia Islands, Dampier Strait, Kofiau and Boo Islands, Mayalibit Bay, West Waigeo, and Southeast Misool) every 2-3 years between 2010-2017, with further monitoring to continue (Andradi-Brown et al. 2017). Monitoring has shown that as of 2017, coral reef health, measured by percent hard coral cover, improved or remained stable in most

of these MPAs despite declines elsewhere globally (Andradi-Brown et al. 2017); the declines seen in Kofiau and Boo Islands and North Misool were small in comparison. Herbivorous fish (Acanthuridae, Scaridae, and Siganidae) play a crucial role in maintaining reef health, particularly in removing algae from the reef, thus biomass of these groups is used as a proxy for reef health: this also increased or remained stable in four of the five MPAs: Dampier Strait, Kofiau and Boo Islands, Mayalibit Bay, and West Waigeo; it was stable within North Misool, but declined in the fisheries use area within Southeast Misool (Andradi-Brown et al. 2017).

Key fisheries species (Lutjanidae, Haemulidae, and Serranidae) are important commercial species for local consumption and export to national and international markets. Results showed increasing or stable biomass for this group in four MPAs: Dampier Strait, Kofiau and Boo Islands, Southeast Misool, and West Waigeo (Andradi-Brown et al. 2017). In Mayalibit Bay, key fisheries biomass was stable in the no-take zone, but declines were apparent in the fishing use zone. This suggests that overall the MPAs are supporting fish recovery and stable reef condition. These positive trends suggest prolonged benefit for local communities, particularly fishers, and the tourism industry.

In terms of habitat and species management, the proportion of important species and habitats subject to specific regulations (i.e. communities implementing specific resource management rules or harvest restrictions) has increased significantly in Dampier Strait and Mayalibit Bay (Pakiding et al. 2019). Habitats managed under community implemented marine resource rules include corals and coral reefs, mangroves, mudflats, sandy substrates, and seagrass beds. Management authorities added several species under specific regulations in the period 2015-2019, including Carangidae, *Katsuwonus pelamis*, *Lethrinus spp*., and *Scomberomorus spp*. for Kofiau-Boo Islands and Delphinidae, Panuliruidae, Serranidae, and Sphyrnidae for Dampier Strait (Pakiding et al. 2019). Despite this increased protection, there are still large areas of important habitats and species with no or limited protection or harvest management in the BHS (Pakiding et al. 2019).

Social Outcomes

The most recent social monitoring data from Raja Ampat MPAs focused on four MPAs (Dampier Strait, Kofiau and Boo Islands, Mayalibit Bay, and Southeast Misool) and was conducted every two years between 2010-2016. Data is collected at the household and community level (Claborn et al. 2017; Claborn et al. 2018a; 2018b; 2018c). Household-level indicators focus on five domains of social well-being: economic well-being (measured as household assets index), health (food security index), political empowerment (marine tenure index), education (school enrollment), and culture (place attachment index) - as well as demographic characteristics and livelihoods. As of 2017, food security improved significantly across all four MPAs, which may be linked to government support programs that have encouraged diversification of livelihoods resulting in a new source of income for households. School enrollment also increased across all MPAs, particularly in Mayalibit Bay where improvements were statistically significant. In contrast, marine tenure declined across all four MPAs, which may be connected to shifts in occupation from fisheries to wage labor, with fewer households actively engaged in the harvest of marine resources. Trends in the connection households have with the marine environment (place attachment) varied across

the region, decreasing in Kofiau and Boo Islands and Mayalibit Bay and increasing in Dampier Strait and Southeast Misool, but remained high overall. Improvements in place attachment may be due to increases of tourism development, causing increased MPA recognition as a special place among households, whereas declines may be linked to rapid environmental changes such as infrastructure development. Trends in economic well-being have remained relatively steady across all Raja Ampat MPAs. Preliminary impact evaluation results have shown that MPA impacts (positive and negative) vary across time and space, implying that local context likely has an important effect on the impacts of MPA establishment (Anggriyani et al. 2020).

Management

In 2019, out of all MPAs in the BHS, North Raja Ampat scored the highest (specifically Southeast Misool) on the World Bank Score Card assessment, which follows a standardized management assessment framework (86% ± 3%; Pakiding et al. 2019; Purwanto et al. 2021). However, the MPA with the lowest management effectiveness score was North Misool MPA, likely because of its recent initiation and first time undergoing the assessment (Pakiding et al. 2019). TWP Raja Ampat, aside from Fam Islands, and both SAPs, were also assessed by MMAF's "Technical Guidelines for Evaluating the Management Effectiveness of Aquatic, Coasts and Small Islands Conservation Areas" (E-KKP3K) in 2015 and 2017 respectively; they are all currently at the "green" level, the third of five levels: red for "under initiation" or "initiated", yellow for "established", green for "minimally managed", blue for "optimally managed", and gold for "long-term self-reliant" MPAs (Purwanto et al. 2021).

Management authorities are required to conduct patrolling activities; responses to violations include warnings, consultations for action with appropriate stakeholders, and further actions taken by the government including: penalties, seizure of proof, and being handed over to police (Boli et al. 2014). Assessments on compliance with MPA regulations reveal that compliance generally increased; in North Raja Ampat, fewer fishers were caught in no-take zones and there was a decline in use of harmful fishing gear in 2019 compared to 2010 (Purwanto et al. 2021). Patterns for South Raja Ampat were more variable. The number of patrols in Raja Ampat since 2010 has increased greatly. Overall, the number of sanctions issued declined significantly at the BHS level, and the sanction status was generally low, possibly due to an improvement in surveillance effectiveness in the majority of the MPAs or that the amount or level of surveillance in the BHS MPAs has decreased; a more in-depth analysis is needed to determine this (Pakiding et al. 2019). Time spent to resolve marine resource use conflicts has decreased in some MPAs such as Dampier Strait, but on the whole most villages appear to have few conflicts or can resolve them amicably (Pakiding et al. 2019).

These results have been included in two "State of the Seascape" (2016 and 2019) reports for the BHS, which report on overall ecological and human well-being status and trends, management, and governance (Ahmadia et al. 2017; Pakiding et al. 2019). Several recommendations are suggested for the BHS as a result, including sustaining monitoring and surveillance; mitigating the threat of blast fishing; increasing awareness of coral mining and managing increasing demand for high value species in the Raja Ampat network; striving to improve food security and education, foster community empowerment and

participation, and increase their awareness of marine resource regulations, and; improve accessibility and awareness of mechanisms for resolving marine resource conflicts (Ahmadia et al. 2017).

Conclusion

Though outcomes are still relatively short-term, the Raja Ampat MPA Network is often recognized as a successful example of MPA establishment and management. This is likely largely in part attributed to the prioritization of community values (i.e. sustainability of local resources for local peoples), translated into prioritizing local stakeholder input in the MPA design, and continuing to have those voices have input in management. These MPAs have been built upon local customary rights, and reinforced preferential use rights for local empowerment, excluding outsiders, and mitigating open access systems. The fluidity and adaptability of the co-management model reflects the diversity of values for these MPAs, with NGOs and the national government providing expertise and acting as convenors to ensure that Raja Ampat serves the primary objectives of conservation and sustainable use. This extends to the management of tourism growth, which has further catalyzed conservation of intact ecosystems through infusion of funds that value them. While there are improvements to be made, such as in surveillance, enforcement, and monitoring, these attributes are highly replicable and recommended to be considered in MPA design elsewhere, especially when using MPA networks as the gateway tool for seascape stewardship.

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Protected Area Case Study: Ulithi Atoll Marine Managed Area, Yap, Federated States of Micronesia

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Context

Biophysical conditions

Ulithi Atoll consists of a ring of about 40 small, low-lying islands, scattered along a coral reef that encloses a large lagoon (Figure 1). It is located roughly 1500 km (900 miles) east of the Philippines and about 660 km (410 miles) SW of Guam in the tropical western Pacific Ocean (Figure 2). Although the total combined area of Ulithi's islands is only 4.5 square kilometers (1.7 square miles), the central lagoon they surround has an area of about 548 square kilometers (over 200 square miles). Inside the lagoon, water depth averages about 30 m (100 feet), but outside the reef drops steeply to depths of hundreds of meters. The Outer Islands are coral islands and atolls scattered over a wide distance, with relatively low populations. (Figure 2)

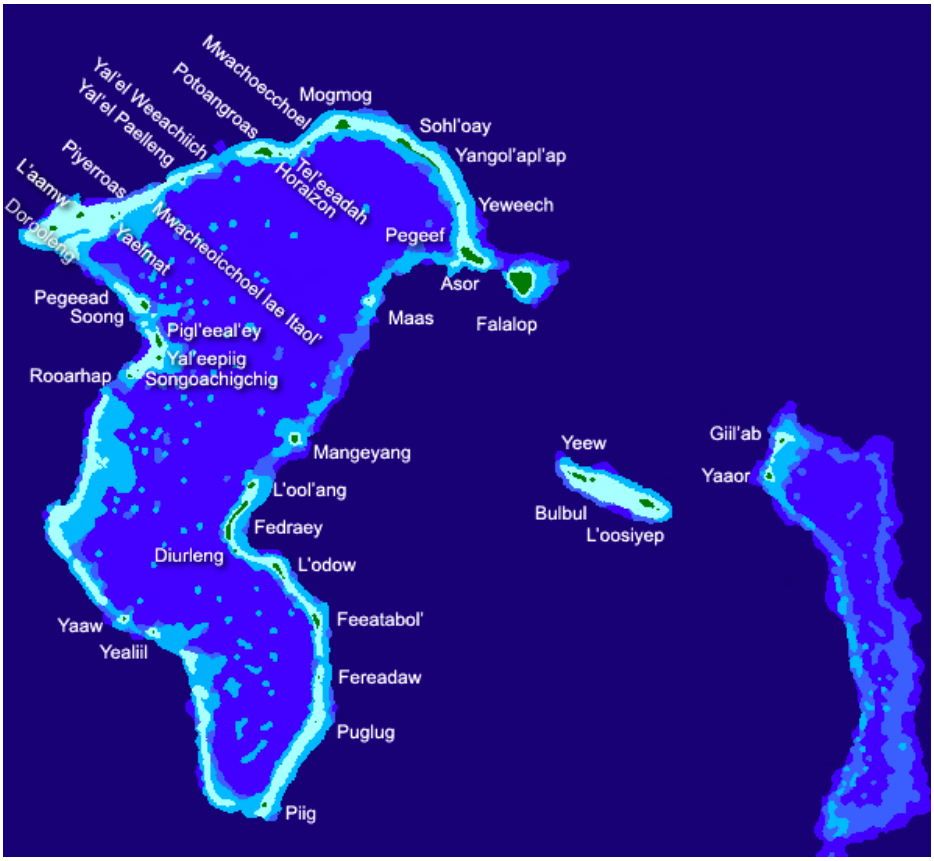

Figure 1. Ulithi Atoll. Source: http://www.pacificworlds.com/yap/home/location.cfmAccessed June 12, 2020

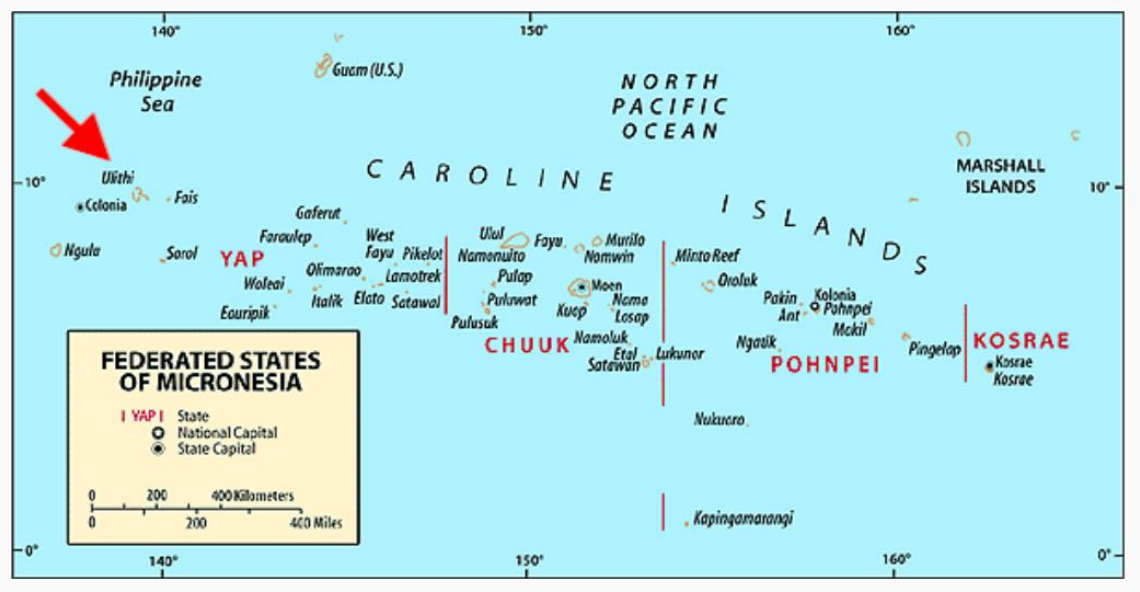

Figure 2. Ulithi Atoll is located in Yap State, Federated States of Micronesia. Source: CIA World Factbook.

Coral reefs of Ulithi Atoll range in overall type, composition and degree of apparent impact by humans (1). Many of the reefs appear resilient, and have shown positive and rapid responses to management, especially management designed and implemented within a traditional context (2, 3). These reefs also have high diversity, and some have been declared as areas of biological significance (4). Reef types show distinct patterns across the Atoll, with benthic and fish communities clustering into comparable groups. Reefs that are oceanic and not near villages have high coral cover (averaging between 40% and 60%) and high fish biomass with a diversity of feeding guilds. Reefs that are oceanic but near villages have lower coral cover between 15%-25% and lower fish biomass as well as feeding guilds, with fewer top predatory fish. A third reef type is inside the lagoon and close to villages with coral cover between 10-15% (not including a 'weedy' coral we identified at these sites (Figures 3 and 4). This reef type was often dominated by a 'weedy' *Montipora* coral that appeared to be overgrowing the reefs, and reducing the structural complexity of the habitat (Figure 4). Given the importance of structural complexity for fishes and mobile invertebrates, this 'weedy' coral has caused considerable concern among the residents of Ulithi, as it appears to be associated with lower fish biomass and diversity (1, 3).

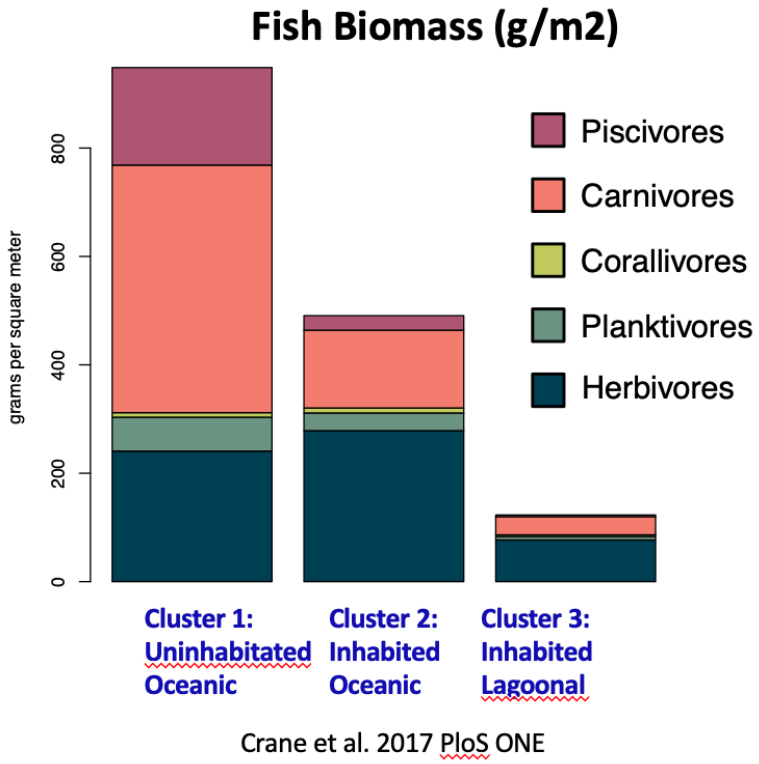

Figure 3. The Atoll reefs cluster by presence of villages and exposure (lagoonal vrs. oceanic) with respect to fish biomass, with the uninhabited oceanic sites having higher overall biomass.

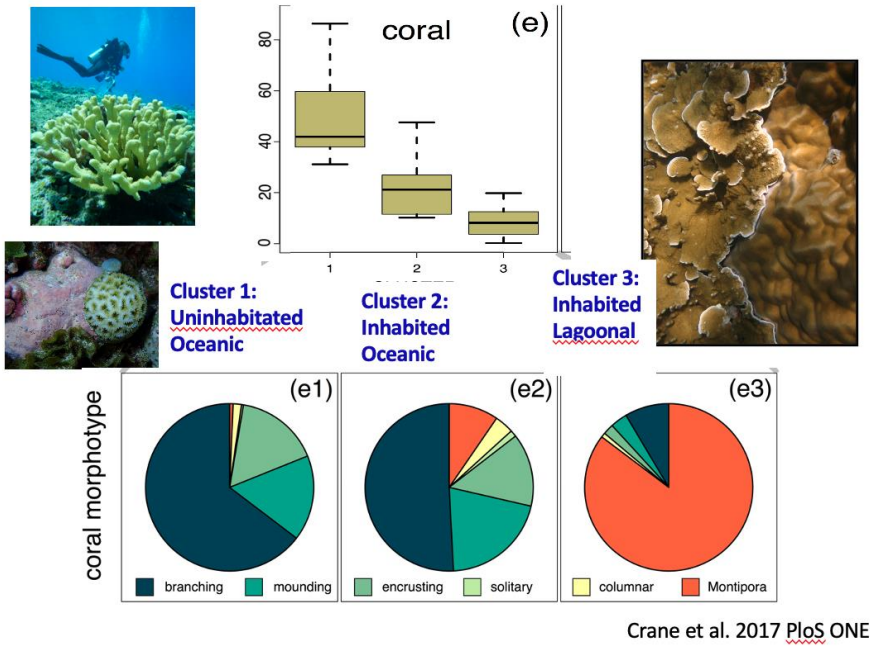

Figure 4. The Atoll reefs cluster by presence of villages and exposure, with highest coral cover and morphological complexity found in uninhabited oceanic sites, and the highest presence of the 'weedy' Montipora found in lagoonal sites near villages.

The drivers of the reef types on Ulithi and other outer island sites include a combination of anthropogenic factors, and reef exposure and location. Although a strong human signature may appear unusual given the low human population density, subsistence fishing, and large size of Ulithi Atoll, it should be noted that even small populations can have substantial impacts on their ecosystems, resulting in a linked social-ecological system that probably goes back many centuries on Ulithi Atoll, as on other Pacific atolls (1). This lends weight to the importance of sound management strategies.

Socio-economic conditions

Four of Ulithi's islands – Falalop, Asor, Mog Mog, and Federai (Fassarai) – are inhabited and have a combined population of about 700-800 native Ulithians (2000 census). These islands are related linguistically and culturally as part of the "Caroline Islands." The Carolinian culture realm reaches East into Chuuk state and West to the outer islands of Palau (Sonsorol, Pulo Anna, Tobi). Carolinians also settled in the Northern Mariana Islands during the 19th century (5).

In spite of significant changes brought about by WWII and earlier contact with explorers, traders, and missionaries, the people of Ulithi today retain much of their traditional island culture, including their native Ulithian language, food sharing practices, and heavy reliance on their coral reef ecosystems for subsistence fishing (6). A household survey conducted in 2019 showed that all households on Ulithi are still involved in fishing and farming activities with a higher percentage of men fishing and higher percentage of women farming and tending gardens and food plants such as breadfruit, coconuts, pumpkins, and taro. Contemporary means of livelihoods have also become more common. About 40% of

the households have members who receive salary from an employment with the government and 13% with the private sector. About one of every five households also depend on family business. Two-thirds of the households receive money from relatives off-island; one-third depend on governmental assistance and 23% receive retirement benefits (7).

Land tenure, inequities

Land ownership is assigned to someone by birth to use and steward over their lifetime. They can pass this on as well. All land and nearshore waters in Yap main island, Ulithi and Fais are held under a complex system of customary ownership. Land ownership is passed down through the matrilineal lineage through clans, but the patrilineal side is responsible for oversight and stewardship. This provides a 'check and balance' system that avoids inequities. The clan system ensures that everyone has access to use land throughout the outer islands of Yap. While someone might not 'own' land on a particular island, through marriage and clan affiliation they have rights to use land throughout the islands. The concept of inequities related to land tenure is foreign to Ulithi. While in a more western system of ownership there may be perceived inequities unrelated to that ownership, in Ulithi, ownership is less important than an affiliation through clans that are tasked with stewardship and use of that land. This system changes on islands past Fais, making the regional system very complex.

Structural inequalities and legacies of colonization, disenfranchisement

Ulithi was heavily impacted by World War II. In 1944 the U.S. converted the atoll to a huge naval base, and it became a staging area for major battles in Palau, the Philippines, Okinawa, and Iwo Jima. During the US military occupation, the native Ulithians were moved onto a single island (Federai), while Falalop, Mog Mog, and other islands were cleared of vegetation and leveled for construction of runways and other military facilities. Heavy, tank-like, tracked amphibious landing vehicles remain underwater near the island of Asor. The islands were used extensively at the time by US armed forces to move troops and equipment between water and were probably used on Ulithi, where they would have damaged coral growing on the shallow reef flats surrounding the islands. At the peak of military activity, over 700 ships were anchored in the lagoon. In 2003 the US Navy removed nearly 2 million gallons of remaining oil and fuel from the wreck shortly after oil was reported to be leaking from the ship. In addition to physical alterations to the islands and reefs, WWII changed the lifestyle of the Ulithian people. Although they retain many of their traditional ways, motor boats, spear guns, and other modern technologies have modified the way people here fish to sustain their families. In most cases, the new technologies have resulted in more intense fishing pressure on a smaller number of target species, compared with more diffuse fishing pressures in the past (3).

Governance context

Politically, Ulithi is an autonomously governed region within Yap State in the Federated States of Micronesia, which is now a sovereign nation having a Compact of Free Association with the United States. In Yap the traditional customary management systems are recognized in the state constitution, integral to the State government management systems. The Constitution allows for autonomous governance by

each community to plan and execute management decisions per their own needs (9) and traditional leaders and estate owners have legal authority to manage specific areas and resources[6]. The elders of the village and the various traditional estates have their distinct roles and responsibilities dictated by the estates they represent (10). Each village has an estate or designated person(s) who calls the village together for meetings; men, women, or jointly. During these meetings, community issues/grievances/ ideas/work are presented and discussed. In the old days, leadership heard community issues and grievances from community members or from their representatives, e.g. from women meetings and through those who played the roles of the community messenger who often also monitored the land and the sea. The traditional communication process can be slowed as it is filtered through the different channels. Decisions were usually made by consensus, and the chiefs made final decisions and proclaimed them. The proclamations were treated as edicts or mandates of the community's will and respected as thus under the traditional structure of the society.

Violators stand to face the community and whatever punishment or restitution the community imposes as part of mitigating a violation of the community's will or disrespect towards the community (10). Traditional penalties of rule breaking could be very harsh, involving a public apology, physical beating, or confiscation of belongings. All these brought much shame to both the violators and their families and were proven to be effective ways to deter rule breaking. Many of these public penalties were removed with the introduction of Christianity.

Marine protected area establishment

Goals of the management

The main goal is to recover degraded reef resources and protect them for sustainable use. Reefs are the foundation of the livelihoods of the people of Ulithi and the protection of the islands. There was a recognition that resources (specifically fish, sharks, octopus, clams and several others) are declining, management has weakened, traditional management is not being enforced on many islands, and that the time to address these issues is now. However an even more important goal is to not displace, disrupt or overturn existing management and traditional approaches. Thus Marine Protected Areas per se were NOT established outside of the traditional closed or managed areas. Instead we collectively strengthened existing systems and added new management as needed.

The local policies, customs and practices determine how reefs and resources are managed "Marine resource management in these outer islands is culturally embedded and includes practices that are

[6] Yap Constitution, Article XIII, Section 5: "The State recognizes traditional rights and ownership of natural resources and areas within the marine space of the State, within and beyond 12 miles from island baselines. No action may be taken to impair these traditional rights and ownership, except the State Government may provide for the conservation and protection of natural resources within the marine space of the State within 12 miles from island baselines." Yap State constitutional provisions on Traditional Leaders and Traditions are found in Yap Const., Art. III. Statutory provisions on Traditional Leaders and Traditions are found in Title 5 of the Yap State Code.

sometimes antithetical to what western managers might consider 'effective'. Most management can be classified as 'partial protection', though this may also include temporary total fishing bans." (8).. Each inhabited island within Ulithi Atoll has a management jurisdiction per their customary system and action plans for their islands. The governance ensures that the reefs from which the livelihood of the outer islanders depends are owned and taken care of by their responsible owners and those resources provide for the people. Mogmog, considered the highest island in terms of ranking chiefs, has a paramount chief who oversees all of the islands, and they are responsible for looking after the people of Ulithi and making the central decisions on interisland issues.

Management and enforcement decision-making

Reef governance and 'management' is complex. Often, an uninhabited island and its reefs are 'owned' and managed by different inhabited islands (Figure 5). For example, an Island might be owned by Mogmog, but Federai has jurisdiction over the reefs. Certain reefs may be owned and managed by specific families, and in some cases, the back reef, reef crest and fore-reef are owned and managed by different families. These linkages to ownership and management rights often go back many generations. A reef owner may decide to enact a management plan for any reason, but generally in consultation with the community if the area is particularly important as a resource generator. The realms of nature, such as the sea, the land, and the sky, have spirits and there are customary practices to please the spirits for bountifulness. These practices have been integral to sustainable management, but the intervention of foreigners occupying or influencing the islands have led to an erosion of many of these beliefs and related cultural practices. These practices were an important part of management, and as they break down, the resources that people depend on begin to decline.

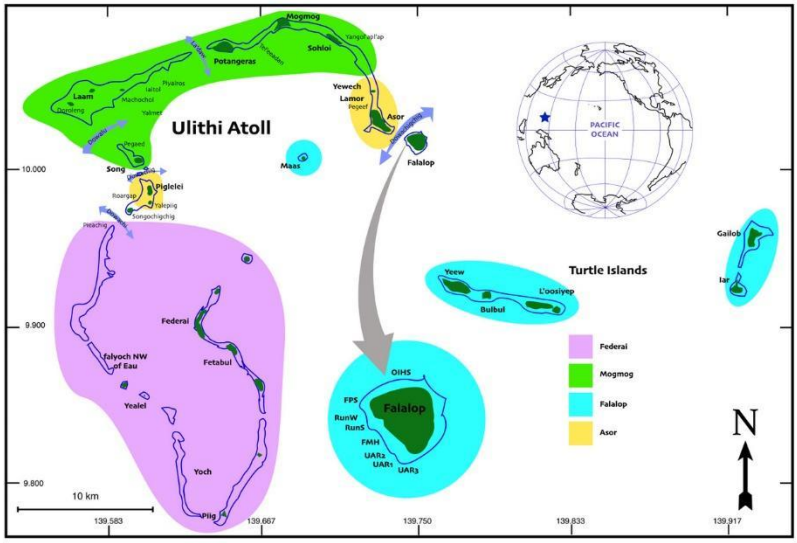

Figure 5. Fishing 'rights' by island on Ulithi Atoll. Each color represents the approximate jurisdiction of each island. They hold the rights to permission for fishing and resource extraction in those areas.

Falalop was the first to re-implement a traditional marine protected area in 2012. It has closed one area of the island to all fishing except community fishing and fishing from shore primarily by women. The other section of the island is closed to night spearfishing and no gillnets or throw nets are allowed (Note: spears and gill nets are more contemporary methods of fishing) (Figure 6) **Mogmog** followed in 2013 and closed the section of its most degraded reef in front of the island (south side) to any fishing except community fishing, and fishing from shore. Gill nets and take of parrotfish by spear at night has been banned. They have also implemented a traditional custom of notification of 'first catch' to signal the opening of lagoon fishing. Also starting in 2013, **Asor** implemented rotating closures on the south facing side of the island (two areas are rotated, and a third area has been closed to all but community fishing). In 2014 **Federai** implemented rotating closures on the west facing side of the main island, and has banned the take of bumphead parrotfish (*Bolbometopon muricatum*) and humphead wrasse (*Cheilinus undulatus*) on all reefs (4). Both of these fish have been designated as species of concern for declining populations (4).

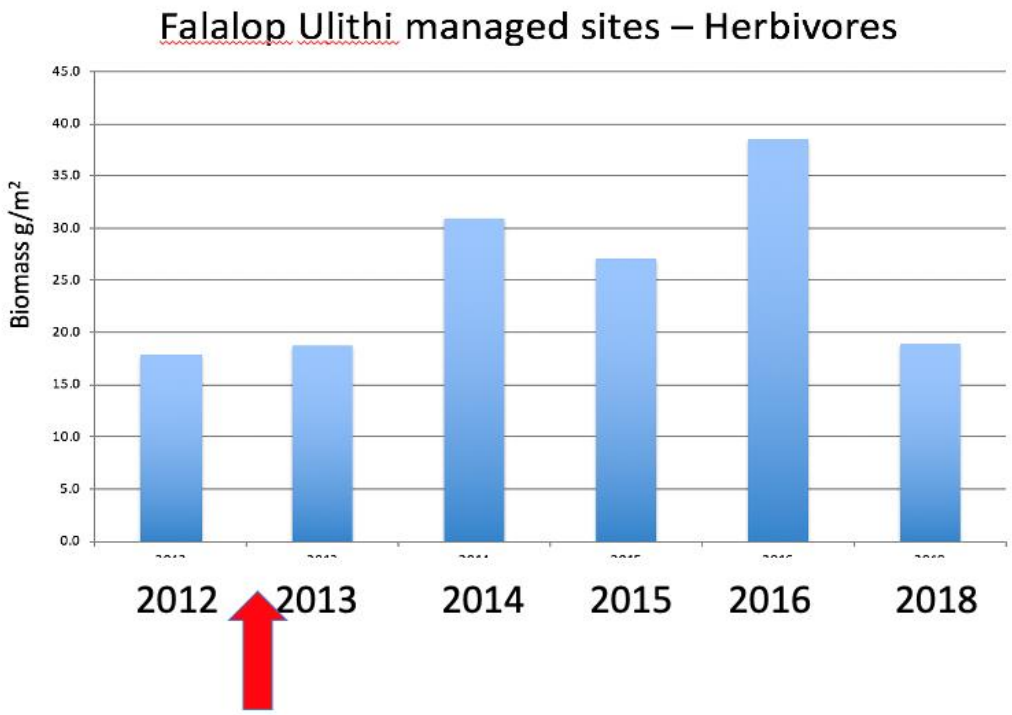

Figure 6. Increase in herbivore biomass since management was implemented. The red arrow indicates when areas were managed (eg. regulations).

Slightly over half of the reefs of the inhabited islands of Asor, Falalop, Mogmog and Federai are now under revised and/or new management as partial, near total and/or rotational closures. Other uninhabited but fished reefs have also received additional protection. Approximately 99% of 471 square kilometers of the fishing area is under management today.

There was consensus among the communities for the main management objective which was for subsistence fishing and resource 'health'. At the local level there was discussion about the consequences of closing certain areas, and how to compensate for some people not being able to fish. For example, on

the main island of Falalop, there was a plan to close the entire island. But that island also houses the outer islands' high school and visiting students (from other islands), and there was a need to fish for the high school students and their sponsor families. The compromise then was to keep an area in front of the high school open for fishing. Similarly, when one area was closed to use by a specific island due to jurisdiction, that island was granted access to a different area when it was open to fishing.

Each protected or 'managed' site was determined and regulated per individual island/reef owner/ Chief decision. Community meetings were held to discuss the importance of management, both ecological and cultural considerations were discussed. Ultimately management planning was locally developed. Almost all of the sites allowed community fishing - specific events where the community could fish and all of the catch was shared. These events were generally regulated by the amount of time and for specific events. Otherwise, management included: some reefs where all other fishing (besides community fishing) was banned, reefs where spearfishing and/or night spearfishing was banned, a combination of gear restrictions and spatial restrictions, rotating closures, and species restrictions. Thus the protection ranged from very strict to much more nuanced. It appears that the reefs responded with increased fish biomass and diversity even at the sites with lower restrictions, although the stronger restrictions resulted in the most obvious increases.

Enforcement is not a big issue (and it is the main issue in most places). In the outer islands, enforcement is community driven, and generally the community is in charge of enforcement

As a part of the management, each community implemented a fisheries landings documentation where fish that were caught were measured and counted (by the fishers, not an outside entity). Although this was in no way meant to intimidate the fishers, it may have had an added benefit of making the community more aware of fishing activity.

The outer island communities rely on a variety of marine resources that vary significantly by island. Each island therefore needs (and historically has utilized) unique management for those resources. Some resources include invertebrates (such as clams), sharks, octopus, and fish. All access was regulated and determined per reef owner and community leaders. Through community meetings and information sharing there was considerable discussion about the importance of sustainable practices. When access was allowed to managed sites, it was within the context of a management strategy. No use was promoted for fishers to extract resources outside of the accepted management plan. While this was not 'policed' per se, social pressure was in effect as fishers could almost never fish without being seen.

The community sought more information from western science teams about the drivers of change on their reefs. They listened to all of the 'briefings', and the One People One Reef science teams returned for multiple years to assess and reassess the reefs. All scientific findings are shared with the community. Decisions to manage specific sites were based on a combination of a recognition that resources were declining, and knowledge of some of the drivers of those changes. Many of the management plans were a restoration of traditional practice, with the exception of regulations around more modern (non-traditional) practices such as spear fishing. Those required specific and targeted regulations (such as bans) for that gear type.

The patterns in reef community structure presented here are currently being used by the people of Ulithi Atoll to develop more effective management strategies. For example, given biological finding that sites that cluster as uninhabited and oceanic also have the highest densities and biomass of targeted fish, managers are utilizing those sites more during good weather and times of ample fuel in order to reduce pressure on sites near villages. Sites closer to villages important sources of food on a regular basis are being managed as rotating closures to enhance spillover. If communities on Ulithi and other outer islands act now by implementing traditional methods informed by scientific data, management may prove effective in a relatively short time period.

Management decisions have also been driven by catastrophic events: Typhoon Maysak (March 2015), for example, destroyed the gardens on Ulithi and many of the terrestrial resources. The reefs that had been protected prior to the typhoon were opened to fishing, and provided a critical food resource, especially important with the destruction of most terrestrial resources and a temporary though significant pause in access to off-island food resources (12,13)

Financial sustainability

The management of reefs on Ulithi is conducted primarily with the understanding that there is a high reliance on the resources from those reefs, thus management translates directly into sustainability and food security. Financial sustainability has not been a primary focus with regard to reef management, although there has been discussion about the importance and need for funds to make it more successful. Some key uses of funding that would benefit management: fuel fund to disperse fishing pressure away from more impacted reefs, funds for data collection and interpretation, funds for local science teams, funds for curriculum development and enhancement with a focus on coral reefs and management, and funds to support the women's cooperatives. There is a lack of information at this point on which (if any) resources can be exploited for financial gain.

Decision making and values

Stakeholders and decision makers

Among the communities there has been a general consensus that traditional approaches and frameworks need to be maintained. In 1991 in order to innovate its system to be more participatory, the establishment of the leadership Council of Ten was created on Falalop. The Council consists of representatives of all 10 clans on the islands. Compared to the past where a decision-making table would be reserved to only certain clans, now everyone who belongs to one of the 10 clans on Falalop can be represented while a traditional system is retained to a certain degree. Additionally, instead of managing individually, a socially unified approach is being implemented so that the leaders of the different islands can coordinate better and communicate and manage together, (3) p10. This is important because the islands are connected biologically and several species are more effectively managed by a *transisland* approach.

In 2014, representatives from the outer islands came together in an unprecedented gathering to address one of the most pressing issues of their time, namely resource management and food security in a time

of rapid ecological and cultural change (14). They exchanged ideas, articulated challenges, and learned from communities on Ulithi as well as the One People One Reef science team about new ways to approach management (through traditional systems with necessary modernization, e,g. for spear guns), and the importance of taking action now (14). This has resulted in enhanced communication among islands and the emergence of an atoll-wide management framework and sharing of plans (3). Community leaders also recognize that they need to be better informed about the reasons for resource declines, including climate change, to be able to lead effectively, and to work with others of influence in the communities (such as those who bring outside resources) to develop a leadership structure that allows effective decision-making.

There were community members who had concerns about management. These individuals were always included in decision making and ultimately had a voice in the process. In general there was very little contest however, as the outcomes were recognized as positive for all. There were concerns that the management may result in a more western system of 'no take'. Ultimately, because the planning was not imposed by 'outsiders', the community was responsible for vetting ideas and criticisms, and took ownership of the process and the results.

Based on informal interviews and focus groups, most community members did not feel any injustice because the planning was within a traditional framework so there was no need to explain any 'western' imposed restrictions. People who were not pleased with restrictions seemed to understand and accept them as community directives.

Values

Ulithi community values were included using focus groups with chiefs, men, women, and youth. The Yap government officials were also included through discussions, meetings and briefings.

There was a concerted effort on the part of community leaders and organizers as well as the 'western' science teams to reach out to multiple stakeholders and demographics. Although there has been an effort to involve youth in recent years, there was a notable lack of youth involvement in the early years. This is partly cultural, as youth are often encouraged not to participate and voice opinions in community matters (over their elders). In recognition of changing times, illness in the elders, and the loss of knowledge as older people pass away or migrate off island for health care, the youth have been encouraged to actively participate in all aspects of management from planning, to materials development to curriculum and after school programs. The youth themselves have organized and are leading the youth involvement now. They see this as important to their own futures as well as the future of their families and their islands.

Knowledge

A critical element to effective contemporary management of reef resources in these islands has been the resurrection and re-implementation of some of traditional practices. There is a western science team (One People One Reef) helping to collect data and inform communities and managers on how the management is working, and on 'hot spots' of the reef where management may be needed, or where

biodiversity is high. A combination of technologies including drones, mapping, genetics, isotopes and benthic/fish characterization are used to inform on the health of the ecosystem and how management is working.

Collaboration between western science teams and local practitioners to better understand the existing as well as the lost practices, and the current ecological conditions on the reefs, as led to effective management planning led by local people (2) (Figure 7). Many of the traditional practices being re-implemented have been studied and 'co-validated' by science teams as being effective, and enhancing traditional livelihood sustainability.

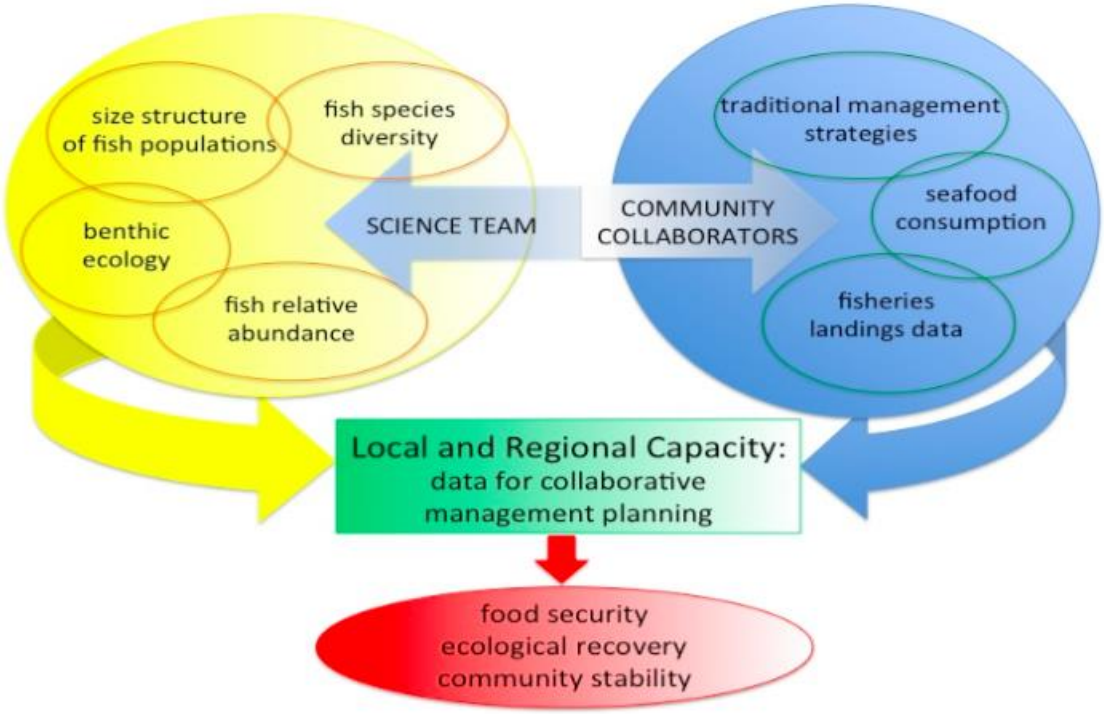

Figure 7. Operational model for the One People One Reef work

Impacts

Overview

Biological survey and social science data show clear positive social-ecological outcomes of the managed areas. Fish biomass has increased at all managed sites since the beginning of this project (3). It has brought back some larger fish and in turn the local food and the livelihoods of the Ulithi people have improved. By managing fish, reefs are being protected. With the banning of some fishing methods and site protection, herbivorous fish populations increased (along with all trophic levels of fish) which appears to have led to partial reef recovery at some sites. Many community members have become more aware of the importance of traditional management, and strong community cohesion. In particular, the youth have become more engaged with management but also with their traditions, and the importance of acquiring

traditional knowledge. Healthy reefs protect islands and people. Management brings communities together to enforce the plans and strengthens leadership. It also helps younger people better understand the importance of management and the traditions that have kept the reefs strong (2, 3).

Ecological

The data have shown remarkable increases in fish biomass at managed sites. In addition, coral recruitment seems evident at several sites. In all cases the effects of management (primarily areas closed to most fishing around the inhabited islands) are evident in an increased biomass since the beginning of the project (Figure 8).

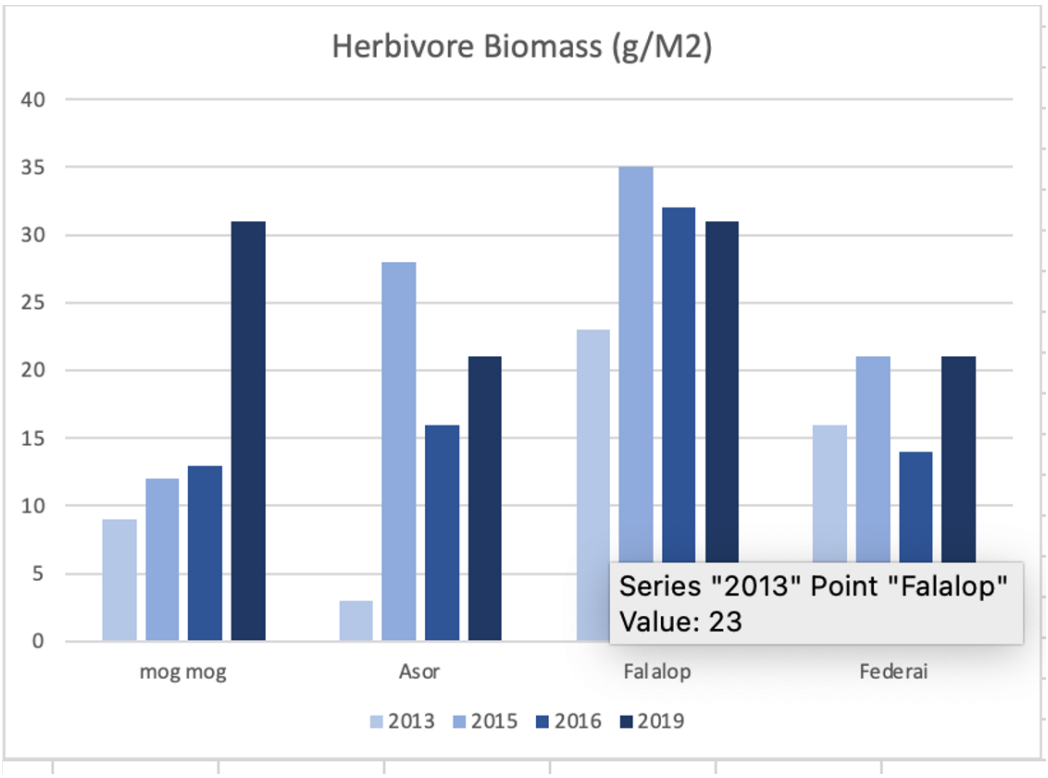

Figure 8. Herbivore biomass at 4 islands in Ulithi over a 7 year period. Note the effects of Typhoon Maysak in 2015/16 at some islands.

Marine reserves on Ulithi have been periodically opened to community fishing, usually to provide for important social events (funerals, graduation ceremonies, etc.). Fishermen also report "spill-over" from the reserves, with larger fish and species previously seen rarely becoming avail able in areas adjacent to the reserves. These reports remain anecdotal, however, and data from standardized scientific surveys of reef fish remain equivocal regarding the likely effect of reef closures on adjacent, unprotected areas.

When Typhoon Maysak hit Ulithi Atoll in 2015, there was a period of time when no food from off island could make it to the communities. During this time, all managed sites were opened to fishing, and the

increases that had been seen there provided for needed food and resources. These sites have since been re-'closed', and the temporary opening does not seem to have negatively impacted the gains.

Provisioning services are primarily related to increases of food fish and food security. Cultural ecosystem services are the connection of place and the revived traditional practices. Strong healthy reefs help the coastline and the atolls to be better protected from natural disasters and climate impacts.

Social

Communities are aware that management needs to be enforced, and in some cases, traditional management brought back, along with some 'newer' approaches. They are ready to implement planning, and are requesting additional knowledge about their reef systems. They also recognize the need for education– for community members and leaders–about the issues of reef and fish decline, and steps needed to reverse them. They feel that they need to recognize and understand the problems first.

Management brings communities together and strengthens leadership. Management requires leaders to bring communities together around the management plan, and how to enforce it. It also helps younger people better understand the importance of management, and the traditions that have kept the reefs strong. Communities have told us that this work to improve management has required them to address leadership issues as well, and has necessitated the opening of dialog between islands, as well as with the COT (outer island Chief leadership council on Yap)."

Methods for evaluating impacts

Annual biological monitoring has been conducted since 2012. A socioeconomic monitoring started in 2019 while focus groups and interviews with community members have been conducted to understand local perception (including of the resource conditions and the effectiveness of management) throughout the project. The extent of this monitoring includes the reefs of the entire Ulithi atolls.

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Appendix

Traditional skills in fishing and harvesting are still used in households

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	1.5	1.6	1.6
	Slightly disagree	1	1.5	1.6	3.1
	Neither	2	3.1	3.1	6.3
	Slightly agree	28	43.1	43.8	50.0
	Strongly agree	32	49.2	50.0	100.0
	Total	64	98.5	100.0	
Missing	System	1	1.5		
Total		65	100.0		

Traditional skills in farming are still used in households

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	1.5	1.6	1.6
	Slightly disagree	1	1.5	1.6	3.1
	Neither	1	1.5	1.6	4.7
	Slightly agree	23	35.4	35.9	40.6
	Strongly agree	38	58.5	59.4	100.0
	Total	64	98.5	100.0	
Missing	System	1	1.5		
Total		65	100.0		

Young people still learn from parents and elders to use and care for reef

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neither	3	4.6	4.6	4.6
	Slightly agree	14	21.5	21.5	26.2
	Strongly agree	48	73.8	73.8	100.0
	Total	65	100.0	100.0	

Households have friends, relatives, and community members to support during difficult times

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neither	3	4.6	4.7	4.7
	Slightly agree	9	13.8	14.1	18.8
	Strongly agree	52	80.0	81.3	100.0
	Total	64	98.5	100.0	
Missing	System	1	1.5		
Total		65	100.0		

The reef and oceans are life

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	1.5	1.5	1.5
	Neither	1	1.5	1.5	3.1
	Slightly agree	4	6.2	6.2	9.2
	Strongly agree	59	90.8	90.8	100.0
	Total	65	100.0	100.0	

Children would like to live the same way of life as parents did in Ulithi

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	4	6.2	6.3	6.3
	Slightly disagree	8	12.3	12.5	18.8
	Neither	8	12.3	12.5	31.3
	Slightly agree	17	26.2	26.6	57.8
	Strongly agree	27	41.5	42.2	100.0
	Total	64	98.5	100.0	
Missing	Not applicable	1	1.5		
Total		65	100.0		

Children would like to learn and understand the traditional ways of management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly disagree	2	3.1	3.2	3.2
	Neither	4	6.2	6.3	9.5
	Slightly agree	20	30.8	31.7	41.3
	Strongly agree	37	56.9	58.7	100.0
	Total	63	96.9	100.0	
Missing	Not applicable	1	1.5		
	System	1	1.5		
	Total	2	3.1		
Total		65	100.0		

Households participated in management planning and decision making for resource management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	4	6.2	6.2	6.2
	Slightly disagree	4	6.2	6.2	12.3
	Neither agree or disagree	7	10.8	10.8	23.1
	Slightly agree	10	15.4	15.4	38.5
	Strongly agree	40	61.5	61.5	100.0
	Total	65	100.0	100.0	

Traditional resource management is still practiced

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	1.5	1.5	1.5
	Slightly disagree	3	4.6	4.6	6.2
	Neither agree or disagree	4	6.2	6.2	12.3
	Slightly agree	23	35.4	35.4	47.7
	Strongly agree	34	52.3	52.3	100.0
	Total	65	100.0	100.0	

Households will get more fish if fish and other marine resources are managed

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neither agree or disagree	3	4.6	4.7	4.7
	Slightly agree	6	9.2	9.4	14.1
	Strongly agree	55	84.6	85.9	100.0
	Total	64	98.5	100.0	
Missing	System	1	1.5		
Total		65	100.0		

More gardens and garden products if land resources are managed

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neither agree or disagree	2	3.1	3.1	3.1
	Slightly agree	3	4.6	4.7	7.8
	Strongly agree	59	90.8	92.2	100.0
	Total	64	98.5	100.0	
Missing	System	1	1.5		
Total		65	100.0		

Lessons from scientists help better manage reef

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neither agree or disagree	1	1.5	1.6	1.6
	Slightly agree	3	4.6	4.7	6.3
	Strongly agree	60	92.3	93.8	100.0
	Total	64	98.5	100.0	
Missing	System	1	1.5		
Total		65	100.0		

Learn enough from scientists to manage reef

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	6	9.2	9.2	9.2
	Slightly disagree	4	6.2	6.2	15.4
	Neither agree or disagree	1	1.5	1.5	16.9
	Slightly agree	23	35.4	35.4	52.3
	Strongly agree	31	47.7	47.7	100.0
	Total	65	100.0	100.0	

Lessons from scientist help better manage fishing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neither agree or disagree	3	4.6	4.6	4.6
	Slightly agree	5	7.7	7.7	12.3
	Strongly agree	57	87.7	87.7	100.0
	Total	65	100.0	100.0	

First thing that worked best for managing reef and fisheries resources

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Reef closure	15	23.1	24.6	24.6
	Gear/method restriction	3	4.6	4.9	29.5
	Revive traditional rules	2	3.1	3.3	32.8
	Education/outreach	1	1.5	1.6	34.4
	Measures/activities that make fish tamer, bigger, more abundant	5	7.7	8.2	42.6
	Strengthen community/local involvement in management	5	7.7	8.2	50.8
	Area restriction	8	12.3	13.1	63.9
	One People One Reef	3	4.6	4.9	68.9
	Species restriction (including fish/sea cucumbers that clean the reef)	4	6.2	6.6	75.4
	Seasonal closure	4	6.2	6.6	82.0
	Reef management	2	3.1	3.3	85.2
	Limit catch amount	3	4.6	4.9	90.2
	Compliance	1	1.5	1.6	91.8
	Scientific input	1	1.5	1.6	93.4
	Don't know	2	3.1	3.3	96.7
	Other	2	3.1	3.3	100.0
	Total	61	93.8	100.0	
Missing	Not applicable	1	1.5		
	System	3	4.6		
	Total	4	6.2		
Total		65	100.0		

Second thing that worked best for managing reef and fisheries resources

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Gear/method restriction	12	18.5	22.2	22.2
	Revive traditional rules	1	1.5	1.9	24.1
	Education/outreach	2	3.1	3.7	27.8
	Measures/activities that make fish tamer, bigger, more abundant	7	10.8	13.0	40.7
	Monitoring and surveillance	2	3.1	3.7	44.4
	Strengthen community/local involvement in management	2	3.1	3.7	48.1
	Area restriction	3	4.6	5.6	53.7
	One People One Reef	2	3.1	3.7	57.4
	Species restriction (including fish/sea cucumbers that clean the reef)	3	4.6	5.6	63.0
	Seasonal closure	7	10.8	13.0	75.9
	Compliance	2	3.1	3.7	79.6
	Size regulation	1	1.5	1.9	81.5
	Scientific input	1	1.5	1.9	83.3
	Seasonal regulation	1	1.5	1.9	85.2
	Don't know	2	3.1	3.7	88.9
	Other	6	9.2	11.1	100.0
	Total	54	83.1	100.0	
Missing	Not applicable	4	6.2		
	System	7	10.8		
	Total	11	16.9		
Total		65	100.0		

First suggestion to improve reefs and fisheries in Ulithi

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	(Revive) seasonal fishing	12	18.5	20.0	20.0
	Continue closures including MPA and rotational areas/seasons	4	6.2	6.7	26.7
	Monitoring and surveillance	2	3.1	3.3	30.0
	Off-shore fishing	7	10.8	11.7	41.7
	Limit or decrease catch	10	15.4	16.7	58.3
	Improve management	1	1.5	1.7	60.0
	Manage waste/trash/pollution	3	4.6	5.0	65.0
	Revive traditional ways of fishing	2	3.1	3.3	68.3
	Ban harvesting fish that clean the reef/water/help coral grow	1	1.5	1.7	70.0
	Scientific input	5	7.7	8.3	78.3
	Limit selling	2	3.1	3.3	81.7
	Area restriction	1	1.5	1.7	83.3
	Gear/method restriction	1	1.5	1.7	85.0
	Strengthen community/local involvement in management	1	1.5	1.7	86.7
	Compliance	2	3.1	3.3	90.0
	Don't know	2	3.1	3.3	93.3
	Other	4	6.2	6.7	100.0
	Total	60	92.3	100.0	
Missing	Not applicable	3	4.6		
	System	2	3.1		
	Total	5	7.7		
Total		65	100.0		

Second suggestion to improve reefs and fisheries in Ulithi

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	(Revive) seasonal fishing	3	4.6	6.0	6.0
	Continue closures including MPA and rotational areas/seasons	4	6.2	8.0	14.0
	Monitoring and surveillance	1	1.5	2.0	16.0
	Fish size regulations	1	1.5	2.0	18.0
	Off-shore fishing	1	1.5	2.0	20.0
	Limit or decrease catch	10	15.4	20.0	40.0
	Improve management	3	4.6	6.0	46.0
	Manage waste/trash/pollution	3	4.6	6.0	52.0
	Gear/method restriction	2	3.1	4.0	56.0
	Revive traditional ways of fishing	3	4.6	6.0	62.0
	Ban harvesting fish that clean the reef/water/help coral grow	3	4.6	6.0	68.0
	Area restriction	1	1.5	2.0	70.0
	Gear/method restriction	2	3.1	4.0	74.0
	Compliance	3	4.6	6.0	80.0
	Eat canned meat/money to buy food at store/rotate eating habits with other imported food	2	3.1	4.0	84.0
	Don't know	2	3.1	4.0	88.0
	Other	6	9.2	12.0	100.0
	Total	50	76.9	100.0	
Missing	Not applicable	4	6.2		
	System	11	16.9		
	Total	15	23.1		
Total		65	100.0		

First traditional ways of managing resources to revive or bring back

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Seasonal fishing	16	24.6	28.6	28.6
	Harvest only as needed	3	4.6	5.4	33.9
	Monitoring resources, including traditional clan	4	6.2	7.1	41.1
	Ensure every household is planting or have plots for planting	3	4.6	5.4	46.4
	Revive traditional practices/management/practices for marine resources	9	13.8	16.1	62.5
	Season cropping/harvesting	8	12.3	14.3	76.8
	Traditional dances/chant	2	3.1	3.6	80.4
	Revive traditional practices/managment/practices for land resources	1	1.5	1.8	82.1
	Don't know	2	3.1	3.6	85.7
	Other	8	12.3	14.3	100.0
	Total	56	86.2	100.0	
Missing	Not applicable	3	4.6		
	System	6	9.2		
	Total	9	13.8		
Total		65	100.0		

Second traditional ways of managing resources to revive or bring back

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Seasonal fishing	5	7.7	11.9	11.9
	Harvest only as needed	5	7.7	11.9	23.8
	Monitoring resources, including traditional clan	1	1.5	2.4	26.2
	Ensure every household is planting or have plots for planting	3	4.6	7.1	33.3
	Revive traditional practices/management/practices for marine resources	5	7.7	11.9	45.2
	Season cropping/harvesting	7	10.8	16.7	61.9
	Educate younger generation	2	3.1	4.8	66.7
	Traditional dances/chant	1	1.5	2.4	69.0
	Revive traditional practices/managment/practices for land resources	4	6.2	9.5	78.6
	Don't know	2	3.1	4.8	83.3
	Other	7	10.8	16.7	100.0
	Total	42	64.6	100.0	
Missing	Not applicable	4	6.2		
	System	19	29.2		
	Total	23	35.4		
Total		65	100.0		

The community work together for the common good

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slighly disagree	2	3.1	3.1	3.1
	Neither agree or disagree	1	1.5	1.5	4.6
	Slightly agree	11	16.9	16.9	21.5
	Srongly agree	51	78.5	78.5	100.0
	Total	65	100.0	100.0	

Families fully feel that they are part of a community as equally as everyone else

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Srongly disagree	1	1.5	1.5	1.5
	Slighly disagree	2	3.1	3.1	4.6
	Neither agree or disagree	3	4.6	4.6	9.2
	Slightly agree	9	13.8	13.8	23.1
	Srongly agree	50	76.9	76.9	100.0
	Total	65	100.0	100.0	

Helping others and community is more important than making oneself better

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Srongly disagree	1	1.5	1.5	1.5
	Slighly disagree	4	6.2	6.2	7.7
	Neither agree or disagree	4	6.2	6.2	13.8
	Slightly agree	13	20.0	20.0	33.8
	Srongly agree	43	66.2	66.2	100.0
	Total	65	100.0	100.0	

Village leaders can be relied on with problems

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Srongly disagree	1	1.5	1.5	1.5
	Slighly disagree	8	12.3	12.3	13.8
	Neither agree or disagree	10	15.4	15.4	29.2
	Slightly agree	14	21.5	21.5	50.8
	Srongly agree	32	49.2	49.2	100.0
	Total	65	100.0	100.0	

Chiefs and leaders make decisions and act to protect community well-being

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Srongly disagree	3	4.6	4.6	4.6
	Slighly disagree	5	7.7	7.7	12.3
	Neither agree or disagree	8	12.3	12.3	24.6
	Slightly agree	14	21.5	21.5	46.2
	Srongly agree	35	53.8	53.8	100.0
	Total	65	100.0	100.0	

One People One Reef helped maintain/improve population of food fish and marine resources

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly agree	10	15.4	15.4	15.4
	Srongly agree	55	84.6	84.6	100.0
	Total	65	100.0	100.0	

Case Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
$familywish[a]	63	96.9%	2	3.1%	65	100.0%

a. Group

Wish for families

		Responses		
		N	Percent	Percent of Cases
wish for family[a]	To be educated	21	13.5%	33.3%
	To have a job/ability to provide oneself	26	16.7%	41.3%
	To live in respect/peace/community harmony/unity/love/good family	57	36.5%	90.5%
	To have prosperity/enough land & sea to provide for my family	35	22.4%	55.6%
	To be healthy	6	3.8%	9.5%
	Not applicable	11	7.1%	17.5%
Total		156	100.0%	247.6%

a. Group

Multiple Response

Case Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
$communitywish[a]	61	93.8%	4	6.2%	65	100.0%

a. Group

Wish for community

		Responses		
		N	Percent	Percent of Cases
wish for community[a]	Stronger cooperation/togetherness/unity	56	35.9%	91.8%
	Peace/harmony/happiness/prosperity	34	21.8%	55.7%
	Respected, effective* leaders/chiefs	10	6.4%	16.4%
	Younger generations to respect elders/leaders	5	3.2%	8.2%
	Equity and stronger sense of sharing	14	9.0%	23.0%
	Food security/more food for community	2	1.3%	3.3%
	Sense of ownership	2	1.3%	3.3%
	Share strong voice and be heard (in meetings or when seeking outside help)	4	2.6%	6.6%
	Respect among people/communities	12	7.7%	19.7%
	Well managed and sustainable resources	6	3.8%	9.8%
	Strong/revived tradition	4	2.6%	6.6%
	Not applicable	7	4.5%	11.5%
Total		156	100.0%	255.7%

a. Group

ICCA Case Study: Hawai'I - E Mau: Enduring approaches to collaborative management of Indigenous and community conserved areas (ICCAs) in Hawai'i

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Context

Huli nā lima i lalo, 'ai ka waha (Turn the hands to the earth, and the mouth will eat)

Through hard work, we are fed and feed others.

--Thomas Hashimoto, Lineal Descendent of Hā'ena

In terms of endemism, the Hawaiian archipelago -- the most remote archipelago in the world -- is a biodiversity hotspot with more than 90% endemism in terrestrial plants and reef fish (Wagner et al. 2020, Kane et al. 2014). Habitat loss, invasive species, and over extraction has resulted in Hawai'i having one of the highest percentages of endangered species and extinction rates in the world (Sakai et al. 2002, Department of Interior 2016), however the vast majority of these calamities has been since the colonial period. Hawai'i is also home to an Indigenous people ('Ōiwi) that developed indigenous resource management (IRM) systems that allowed for biodiversity to thrive in social-ecological systems (Winter et al. 2020), and employed agroecology methods that could have sustainable supported more than a million people (Kurashima et al. 2019). The efforts to protect habitats and biodiversity in the midst of large human populations has many turning to Indigenous wisdom and practice, which in Hawai'i has manifested as biocultural conservation and restoration (IUCN 2016, Chang et al. 2019, Gon and Winter 2019).

'Ōiwi (Indigenous Hawaiian) systems of IRM were developed to optimize a broad suite of reciprocal ecosystem services including food production and native species protection. The mechanisms for governing human behaviors and actions was nested within a belief system which included a system of kapu (sacredness) and kānawai (regulations to access sacredness) (Kurashima et al, 2018). These IRM systems traditionally used a decentralized approach where islands were divided into regions that extended from the mountains to the nearshore waters (moku), and communities (ahupua'a) for place-

based governance and resource management (Gonschor and Beamer 2014, Winter et al. 2018). Population dynamics and connectivity of resource (e.g., fish, birds, and plants) were collaboratively managed at the moku scale. Habitat (forests, streams, and reefs) protection and management, and resource extraction were governed at the ahupua‘a scale to achieve and maintain a state of sustainable resource abundance known as ‘āina momona (Fig. 1, Winter et al. 2020a). Examples of this include the designation of wao akua (sacred forest) and temporary area closures regulated by kapu (Winter et al. 2018). This IRM approach maintained high levels of biodiversity throughout the pre-contact period. However, a period of colonization and occupation led by Americans and Europeans resulted in a dispossession of Indigenous lands, transformation of the landscape, shifts from agroecology to agriculture, and regime shifts in governance and resource management, which changed from a decentralized to a centralized approach (Winter et al. 2018). The result of this was massive habitat losses and spikes in extinctions.

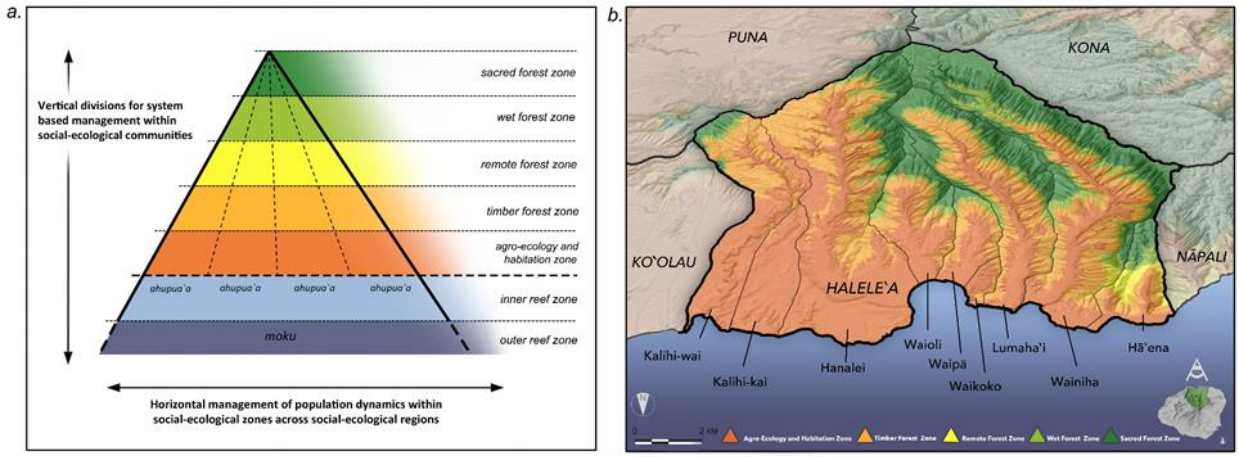

Figure 1. (a) A schematic diagram of moku (region) and ahupua‘a (communities) documented from the island of Kaua‘i with (b) modeling used to depict how this looked on the ground using the moku of Halele‘a as an example (from Winter et al. 2020a).

Despite 150 years of colonization and occupation, a renaissance of ‘Ōiwi culture -- beginning in the 1970s -- ushered in an era of revival of Indigenous practices, including IRM (Chang et al. 2019, Gon and Winter 2019). ‘Ōiwi values—such as aloha ‘āina, or loving the land as a familial elder; mālama ‘āina, or caring for the land as a familial elder (Kealiikanakaoleohaililani & Giardina, 2015); and kia‘i ‘āina or protecting the land as a familial elder -- are at the foundation of this revival of ‘Ōiwi IRM. When these values are acted upon, they represent forms of Indigenous agency in conservation efforts (Winter et al. 2020b), which has been pivotal to the regeneration of IRM in mainstream conservation efforts in Hawai‘i, including the growing number of Indigenous and community conserved areas (ICCAs) in Hawai‘i.

Though there is progress towards the reestablishment of IRM, there is a major discrepancy between the decentralized scale of stewardship as defined by Hawai‘i‘s Indigenous People and Local Communities (IPLC)—the ahupua‘a scale—versus the scale of management that Hawai‘i’s centralized bureaucratic system operates—the state scale. In order to effectively steward their places using ancestral practices and

values, communities have compromised and engaged in novel forms of collaborative management (co-management) regimes with governmental agencies. These innovative approaches build on IRM practices and represent some of the first formally recognized ICCAs, which serve to protect multiple habitats and unique biodiversity, while perpetuating Indigenous practices and operating within the community's ahupuaʻa scale (Delevaux et al. 2018, Vaughan 2018, Winter et al. 2020b). We will highlight this ʻŌiwi values-based approach using case studies from multiple novel approaches to ICCAs within these communities that have been formally recognized through co-management agreements led by the IPLC. These ahupuaʻa are on three different islands in the Hawaiian archipelago. The ahupuaʻa of Hāʻena in the moku of Haleleʻa on the island of Kauaʻi, the ahupuaʻa of Heʻeia in the moku of Koʻolaupoko on the island of Oʻahu, and the ahupuaʻa of Kaʻūpūlehu & Kūkiʻo in the moku of Kona ʻĀkau on the island of Hawaiʻi.

Study sites

Hāʻena (Kauaʻi Island)

Hāʻena is an ahupuaʻa on the Northwestern coast of the island of Kauaʻi, geologically and in ʻŌiwi oral history, the oldest of the main islands in the Hawaiian archipelago. The area is known for its significance in moʻolelo (stories), which share of the abundance of Hāʻena's land and ocean, and the generosity of its people in feeding visitors (Hoʻoulumahiehie 2006). Hāʻena is formed of two small valleys cut by streams flowing with plentiful fresh water feeding coastal plains for cultivation of taro and other crops. The coast is fringed by one of Hawaiʻi's larger barrier reefs, broken by four small bays, which provide spawning grounds for schooling fish in the summer months (Jokiel and Brown 1998). In the winter, Hāʻenaʻs coast is pounded by large north swells, which fling sea spray along the pinnacles of cliff above the beaches and provide a natural resting period for area fisheries. Traditionally in Hāʻena, ʻohana fished small areas of the coast, concentrating on particular reefs near their homes, and leaving other stretches of reef for other families (Vaughan, Ayers & Thompson 2016). They were caretakers of these areas, often described as their ice box, where they would go to catch daily meals (Vaughan 2018).

Hāʻena is located at the northern end of Kauaʻi's two lane highway. For centuries, families of this area lived in relative isolation, with visitors accessing the area mainly by sea. However, beginning in the 1970s a steady stream of tourists began to make their way to the area, with over a million visitors accessing Hāʻena in recent years. The highway is easily cut off by disturbances, such as hurricanes and tsunamis, and landslides which occurred after recent intense flooding in 2018, emphasizing the importance of area farming and fishing activities for sustenance of the local population of approximately 600 residents (Luebbe et al). Hui Makaʻainana o Makana is a Hāʻena community organization formed of indigenous Hawaiian families who had ancestors in Hāʻena prior to 1850. Though many of their families can no longer live in the area due to an influx of wealthy Americans buying beach homes there, Hui members gather regularly to care for area taro patches, run cultural education programs, patrol coastal fisheries, and collectively make decisions regarding area resources (Vaughan 2018).

He‘eia (O‘ahu Island)

He‘eia is on the northeast side of O‘ahu in the moku of Ko‘olaupoko, a region that contains some of the shortest watersheds in the archipelago. Abundant rainfall results in springs and perennial streams, supporting Indigenous agroecology and aquaculture systems that sustained tens of thousands of ‘Ōiwi traditionally. This region is also home to the largest lagoon in the archipelago—Kawahaokamanō, now commonly referred to as Kāne‘ohe Bay, the abundant resources of which also historically fed the people of this region. Urbanization and development in the modern era destroyed Indigenous infrastructure and had disastrous ecological effects in the Bay. Collaboration is valued within this community, which is reflected in the way IPLC organizations work with each other and with government agencies. Engaged IPLC leaders led efforts to engage government agencies in various co-management efforts to restore the ecological integrity of the bay after the dumping of raw sewage into it was stopped.

Ka‘ūpulehu (Hawai‘i Island)

Ka‘ūpūlehu is an ahupua‘a in the district of Kekahawai‘ole o nā Kona, a poetic name which speaks to the scarcity of water resources in the area. The lack of surface water limits land-based food potential, however, the region has rich ocean resources which supported ‘Ōiwi communities in this isolated and rugged district for generations (Maly, 1998). In 1975, highway construction opened the region, turning a rarely traveled rugged plain into easily accessed coastal lands, leading to an influx of people to their shorelines. Since then, the ‘Ōiwi community has observed severe declines of coastal and marine resources in their region (Ka‘ūpūlehu Marine Life Advisory Committee, 2016).

The contemporary regime of biocultural resource management in Ka‘ūpūlehu, was catalyzed by a legal settlement over marine and coastal resources impacted by a luxury development in the area. In the 1990’s, two IPLC organizations, the Kona Hawaiian Civic Club and the Office of Hawaiian Affairs in one, and Ka Pa‘akai o Ka ‘Āina, an alliance of local community and lineal descendants of Ka‘ūpūlehu, in another, intervened on two permits put forth by the development two different developers in the ahupua‘a. The interventions were pivotal for raising the standards for the treatment of biocultural resources at the Federal, State, and County levels. One intervention settlement mandated the creation of the Ka‘ūpūlehu Marine Life Advisory Committee (KMLAC) which has been a critical entity in the stewardship of the coastal and marine resources of Ka‘ūpūlehu. The KMLAC is officially made up of representatives of the parties to the case—IPLC organizations, the developers, and kūpuna (elders) of Ka‘ūpūlehu who provide guidance and NGOs who provide technical support and facilitate planning (Ka‘ūpūlehu Marine Life Advisory Committee, 2016 [Appendix F]).

Protected Areas and Values

Hā‘ena CBSFA

Hā‘ena, Kaua‘i is the first permanent community-based subsistence fishing area (CBSFA) in Hawai‘i, a state recognized marine protected area designation which allows the community to make fishing regulations based on local knowledge and practices. The CBSFA effort began over thirty years ago as Hā‘ena elders

began to articulate concerns about declining marine resources and their fear that future generations would not be able to sustain their families from the sea. While the CBSFA regulates only the nearshore fishery, from shore to one mile out or within the fringing reefs, community efforts to care for Hā‘ena begin in the mountains, with establishment of an area botanical garden in the 1976, restoration of native species in the remote back valleys, and co-management agreements with the state of Hawai‘i to care for the community’s traditional agroecosystems (Vaughan 2018).

Two key guiding values articulated frequently by area elders were that 1) the health of the ocean starts on land, and 2) the importance of building relationships and credibility with state agencies, through pono caretaking of the lo‘i (taro patches) with which the community had been entrusted. As respected fisher and elder Thomas Hashimoto, always used to tell younger community leaders, it all starts with the lo‘i, the first area the community formally began to co-manage with the State Department of Land and Natural Resources (DLNR). He reminded us always that we could not ask for more authority over the coast, unless the lo‘i was well cared for (Vaughan 2018). The value of showing community capacity through work, feeding and hosting, through actions, rather than talk, was foundational to co-management efforts. Three other key values underpinned community developed regulations for the fishery. Fishing is understood as care taking, rather than just harvesting. Secondly, lawa pono, taking only what you need, and harvesting with care and restraint is a key value articulated by area elders, which was reflected in restrictions on overly extractive gears such as lay net and spear guns, as well as catch limits on key species from lobster to limpets. Another key value was protection of reproductive cycles of fish, operationalized in state rules through designation of a key spawning area, a bay named Mākua (literally parent) as a kapu area, off limits to both harvest an entry, to avoid disturbance of this nursery (Vaughan, Ayers & Thompson 2016).

He‘eia NERR

In the 1970s first-generation leaders of the Hawaiian Cultural Renaissance Movement in He‘eia fiercely fought existing and planned development that threatened the health of the ecosystem and the wellness of their people. This included stopping a municipal wastewater plant that had for decades been dumping raw sewage into Kāne‘ohe Bay, which decimated the coral reefs and nearshore fishery; and halting the construction of a nuclear power plant, which was the first time an ‘Ōiwi community prevailed over the US military in court. Around the turn of the century, second-generation leaders of the Renaissance began non-profit organizations to restore cultural sites and restore Indigenous agroecology and aquaculture systems on a landscape scale. In the 2010’s, in an effort to metaphorically get everyone in the same canoe and navigate towards the same star, these two generations of Renaissance leaders -- the first generation then representing community elders -- banded together in an effort to collaboratively restore the ahupua‘a. One of the outcomes of these multipronged efforts was the creation of the He‘eia National Estuarine Research Reserve (NERR), which is a co-management agreement entered into by ‘Ōiwi organizations and government agencies (both state and federal). Formally designated in 2017, the goal of the Reserve is use federal resources with state government authority and community power to collaboratively support restoration of the ahupua‘a from the mountains to the sea using IRM, and to conduct collaborative research to inform adaptive co-management (Winter et al. 2020c).

Ka‘ūpūlehu Reserve

Ka‘ūpūlehu is home to the first community-driven 10-year rest area in the state, which restricts take of any marine plant or animal within the ahupua‘a of Ka‘ūpūlehu and Kūki‘o along 3.6 miles of shoreline out 20 fathoms (120 ft) (State of Hawai‘i, 2016). Sparked by the declines experienced by the ‘Ōiwi community, the goal of the reserve is to replenish the marine resources of Ka‘ūpūlehu, so that a management plan can be prepared during a time of ecological stability and abundance. The goal is responsible harvesting within the area in perpetuity, ensuring that the lineal descendants can continue to mālama (care for) their ancestral place. The idea for the reserve began in the early days of the KMLAC. Though the group is made up of representatives who were on opposite and conflicting sides of the legal interventions (i.e., developer vs. descendants), they fought to always practice aloha kekahi i kekahi, or mutual respect. This practice has led to the successful initiatives and actions, which time and again has garnered support from the larger local community, the development staff and new homeowners, the landowner, funders and the regulatory agencies.

Another value the KMLAC holds true, is to always be guided by the elders of the region. At the piko (core, naval) of the KMLAC are the elders and other younger lineal descendants, those who have endured to nohopapa - to continue to live, work, and remain on their kulāiwi (place where the bones of one’s ancestors lay). It was an elder who had the idea for a 10-year rest period, so that the community could continue to practice their tradition of caring for, which always comes before harvest. The KMLAC is currently developing its sustainable fishery management plan, which will be applied after the 10-year rest period is over in 2026. The plan will maintain the vision of the elders and is grounded in the traditions and values of Ka‘ūpūlehu. Like the Hā‘ena community, the KMLAC is focused on creating culturally appropriate regulations that will guide the sustainable harvest of resources and allow for adaptive management going forward.

Enforcement

Official rules and regulations within co-managed ICCAs are codified in administrative rules packages within various State Divisions (e.g., Division of Aquatic Resources, Office of Conservation and Coastal Lands, Division of Forestry and Wildlife, State Parks Division) within the State’s Department of Land and Natural Resources, which itself is a centralized bureaucracy. These rules and regulations are enforced by another Division, the Division of Conservation and Enforcement (DOCARE). Creating holistic, decentralized rules for ahupu‘a regulated by codified administrative rules within this bureaucracy presents challenges. IPLCs have had to make compromises to get enforceable rules accepted into law. For example, many of the tools of IRM (e.g., kapu/kānāwai or Indigenous restrictions) are not allowed by the DLNR (Vaughan, Ayers and Thompson, 2016). As a result, if the IPLC wants to impose a kapu on a place or a species, they do it themselves for themselves, but it isn’t a rule that is enforceable by law, so it is challenging to get outsiders to follow it.

All three ICCAs highlighted here, have never intended to rely solely on the state for enforcement. Their ability to enact formal state recognized management and regulations is built upon a long history of simply

acting upon their kuleana, sense of responsibility to care for their land and resources, often in the absence of any state action or presence as the State Divisions responsible for management and enforcement are perpetually underfunded and understaffed. In developing their fishery rules, the Hāʻena and Kaʻūpūlehu communities always expected that 90% of enforcement would be education. Both through partnerships within DLNR known as Makai watch, where community members serve as eyes and ears on the coast, then report violations to DOCARE for enforcement action, and through more informal presence and patrol of their area, community members in all three areas provide the main mechanism of enforcement of pono (right or balanced) practices. While repeat offenders and folks who resist educational outreach may require calls to DOCARE, all three areas are now known for community care taking and stewardship. This reputation alone discourages many violations and enables the community to teach and ask behaviors that may not be approved in formal regulations but are nonetheless pono. Co-management authority is always contested with the state, against the backdrop of ongoing occupation of Hawaiʻi by the U.S. government and the growing realization that state agencies are not only illegal under international law, but ineffective. Yet all three areas have forged relationships with state agencies.

Economics

Most community-based land and sea initiatives in Hawaiʻi for ICCAs are funded by short-term grants. The lack of long-term stable funding is unsustainable for long-term planning and success—for example staff are often hired on a temporary basis and projects are funded in a piecemeal fashion. There is a need for creative and sustainable funding models that can leverage economic investments into IPLCs to catalyze circular economies at the ahupuaʻa scale. One emerging project is the Ahupuaʻa Accelerator Initiative co-funded by an ʻŌiwi Trust and a local foundation that will focus on directly supporting all three of these communities to develop their own place-based solutions that can contribute to developing sustainable and functional economic models for ahupuaʻa management.

Another innovative funding mechanism is the Kaʻūpūlehu Foundation, a non-profit organization, mandated by the legal settlement in the area. Luxury homeowners in the area are required by their property agreements to pay a percentage of their real property value to the Foundation each year. This money is specifically earmarked to amplify Kaʻūpūlehu's ʻŌiwi traditions and practices, protecting the natural and cultural resources of the ahupuaʻa through providing a large and perpetual cash flow to community-based land/sea-based projects in the relatively small area.

Outcomes

Towards abundance

All of these protected areas have demonstrated ecological gains. In Hāʻena, fish abundance, biomass, and species richness are higher within the CBSFA than outside of its boundaries and is shown to be protecting larger fish (Rogers et al., 2020). In Kaʻūpūlehu, environmental recovery of the reef fishery has been shown not only within the designated area itself, but also in surrounding zones. In just two years since the designation, monitoring has shown increases in biomass of important resource fish like surgeonfish, with

a 46% increase within the reserve, and a 21% increase outside the reserve (Minton et al., 2020). In He‘eia, restoration efforts across the ahupua‘a have resulted in the return of culturally important, endangered water bird species to the area, including number of successful breeding seasons (Harmon et al. 2020). The Ka‘ūpūlehu and Hā‘ena communities also partner and collaborate with Nā Maka Onaona, an ‘Ōiwi organization which focuses on helping communities develop their own biocultural monitoring approaches in the intertidal zone that are locally tailored to the community’s long-term goals of abundance (Morishige et al, 2018). This placed-based approach has built monitoring capacity within the communities and the data is being directly integrated into community-based management planning for a holistic thriving community, inclusive of ecological resources. At all sites, these surveys and results are possible through the communities’ integral partnerships with ‘Ōiwi organizations, conservation NGOs, the University of Hawai‘i, and innovative funding mechanisms like the Ka‘ūpūlehu Foundation. Furthermore, after the designations in Hā‘ena and Ka‘ūpūlehu, there has been a noticeable increase in overall support for community-based marine initiatives in Hawai‘i, indicating statewide and even international social achievements of these innovative place-based approaches. For example, Haā‘ena, along with the ICCA of Mo‘omomi on Moloka‘i, together won the UN equator prize in 2019.

Compromises

In all three areas, community members have had to compromise in order to conserve and protect the resources that sustain them. Sometimes these compromises have been necessary to resolve conflict with surrounding stakeholder groups, as in He‘eia where property owners surrounding the fishpond and upland restored areas constantly challenge hours and access of educational and work groups. In Hā‘ena, the specific protected area for spawning ended up being less than a fourth of the size the community initially proposed due to compromises with recreational users such as kite surfers who did not want access to key surf breaks and channels closed off. Multiple proposed rules were deemed unenforceable by state agencies, or not allowed under enabling co-management statutes as they pertained to other divisions within DLNR, such as boating instead of fisheries (Vaughan 2018). Ka‘ūpūlehu may have avoided erosion of the strength of proposed rules through one simple rule, a 10-year ban on all fishing activities in the region, rather than seeing the strength of their rules impaired through state agency and State legal review of every single proposed gear restriction. Yet, the community there must sacrifice teaching a generation of children to fish where their parents learned, and will have to deal with these State reviews in their upcoming plans.

Another issue is the balance of public access rights with those of the community. ICCAs in Hawai‘i often have to face giving up all activities they want to regulate, even if they might be sustainable when practiced only by a small group of ‘Ōiwi families, because State law does not allow differential rules based on identity. For example, in the Hā‘ena CBSFA process, state law would not allow for regulations that reserved fishing in the most accessible safest, highest reefs for only elders to gather, a long-time practice in the area. However, the community still managed to emphasize knowledge of particular areas by banning gears that allow anyone to fish with little skill and no prior relationship of a place. These banned gears include lay nets, spear guns (versus handheld three prong spears), and night diving.

Despite these conflicts and challenges, ICCAs in Hawai‘i have moved forward through being willing to compromise, forging alliances with diverse groups, including non-indigenous community members, and government agencies, and always keeping their broader goals in mind. The communities in each of these areas focus on the long term and cross generational outcomes, moving ahead in whichever ways avail themselves at the time. As one long time Hā‘ena community member said of the CBSFA rules initiative, “It is not sovereignty, but it’s what we‘ve got now.”

Holistic Approaches

A central tenet of ‘Ōiwi IRM is the coupled relationship between the biodiversity of the land and that of the ocean, as well as the interrelatedness of the health of the mountains and the ocean (Winter et al. 2018). IPLCs that are engaged in biocultural restoration at the ahupua‘a scale often have ICCAs within both coastal and upland areas, although few communities have both coastal and upland areas formally recognized through co-management agreements. The three ahupua‘a highlighted in this case study do have multiple habitat areas formally protected through co-management agreements (Table 1).

Ahupua‘a (Moku, Mokupuni)	**ICCA formally recognized via a co-management agreement**	**Habitats protected**				
		Nearshore waters	**Wetlands**	**Streams**	**Coastal forest**	**Upland forest**
Hā‘ena (Halele‘a, Kaua‘i)	Community-Based Subsistence Fishing Area (CBSFA)	X				
	Curatorship Agreement with State Parks		X		X	
	Limahuli Preserve (National Tropical Botanical Garden)			X	X	X
He‘eia (Ko‘olaupoko, O‘ahu)	National Estuarine Research Reserve (NERR)	X	X	X	X	
Ka‘ūpūlehu and Kūki‘o (Kona ‘Akau, Hawai‘i)	Reserve (Fish Replenishment Area)	X		N/A		
	Memorandum of Agreement (MOA)		X	N/A		
	Curatorship agreements with Landowner - Dry & Mesic forests			N/A		X

Conclusion

The IPLCs of Hawai‘i have endured imposed development, resulting resource degradation, systemic injustice in the governance of their resources, an influx of new residents, and decades long legal battles, to continue to do what they have always done: care for their places. Though lacking the level of recognized rights other global ICCAs possess to govern their indigenous territories each of these three communities highlighted have used whatever tools were available to create their own pathways to resource governance. Hā‘ena, He‘eia, and Ka‘ūpūlehu communities collaborate with a diverse array of community, private, and government entities in order to care for their ancestral territory, from the ocean, coasts, up to the mountain peaks of their watersheds. In all cases, community leaders have emphasized, not their rights to care for these areas, but their collective responsibilities to place. Through their humility and perseverance, they have helped shift numerous State and Federal systems agencies to go beyond their conventional procedures, forcing government to develop new avenues to co-management which offer pathways to other Hawai‘i communities seeking to exercise ancestral responsibilities to their home areas.

Designation of protected areas, such as fishing closures, and strictly regulated access to sacred forest sites is an ancestral tool within ‘Ōiwi IRM globally and in Hawai‘i. However, many other decentralized and holistic approaches of IRM have not been compatible with imposed centralized and bureaucratic governance systems. Hawai‘i provides novel examples of how IPLCs nonetheless perpetuate IRM practices and community level decision making through informal means as well as through formal policy channels. One key element woven through efforts of Hā‘ena, Mo‘omomi And Ka‘ūpulehi, is their emphasis on education, on teaching future generations to endure, carry on and innovate, just as their predecessors have for generations, so that the land and ocean may continue to thrive and provide sustenance . Formal designation of ICCAs with delineated boundaries for co-management is a progressive step towards reviving IRM now and in the future. In the establishment of each of these communities’ protected area, the IPLC compromised many of their traditions and lifeways to make sure that their resources are cared for. Ultimately the goal is that the resources and the community thrive in their ancestral homes. These efforts are indicative of enduring nature and adaptability of Indigenous People, as reflected in this quote by one of our elders:

“During our time, we have seen ali‘i (chiefs) rise and fall. We have seen our island nation born and die before its time. We have seen political parties wax and wane. We have seen elected and appointed officials come and go. But we remain. We have been chiefs and fishermen, goat herders and cattle ranchers, gardeners and homemakers. We have lived under two flags and a series of constitutions. Personally, caring less about the flag flying over the land than the life on the land. We aspire to contentment and to share the joy and blessing of calling Hawai‘i Nei home. We aloha i kekahi i kekahi (love or have reciprocity with one another), and mālama (care for) the same. And we remain on the land and pray that this long be so.”

- *Hannah Kihalani Springer, Lineal Descendant of Ka‘ūpūlehu*

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ICCA Case Study: Kaya Kinondo, Kenya

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Search methods

To find an ICCA in Africa, I searched Web of Science with the following keywords: TS = (Africa AND values AND Aboriginal OR First Nations OR Indigenous OR community AND plurality OR Indigenous Community Conserved Areas OR Forest OR Tribal parks AND outcomes OR effectiveness OR 'knowledge co-production' OR 'co-management' OR governance). From within these results, I chose Kaya Kinondo Forest in Kenya. Then I conducted a search for just "Kaya Kinondo," which revealed 188 results. I scanned abstracts to select papers that dealt with forest, and read the most relevant ones, and pursued sources cited within these.

Case study

Kaya Kinondo is a 30 ha sacred community forest located in the south coast of Kenya in the Kwale District. It sits on a fossil coral reef (Kihima and Kimaru, 2013) a mere 100 m from the ocean. Kaya Kinondo is one of about 40-60 kaya forests (plural: makaya) in Kenya, which served as the ancestral home of the Majikendi Peoples (Kihima and Kimaru, 2013). The Majikendi Peoples speak nine similar Bantu languages; the dialect spoken in the communities surrounding Kaya Kinondo is called Digo. Historians suggest that Digo-speaking Majikendi People established Kaya Kindondo in the 1600s-1700s (Ndzovu, 2013). However, residents cite that the Kaya is more than 600 years old (Yuji et al., 2005). The region supports agriculture, though it is hampered by variable rains (Nyamweru, 1998).

The makaya were founded as fortified villages (kaya is directly translated as 'village') surrounded by thick forests; the forests only had narrow paths running through them, thereby offering significant protection (Ndzovu, 2013). In the late 1800s, people began living on the outskirts of makaya, and the makaya transformed from a population center into the center of ritual, unity and sacredness (Brantley, 1981). A host of associated taboos, rules, and traditions rose up around what behavior is appropriate in the kaya and with respect to specific sites within the kaya (Ndzovu, 2013).

These forests conserve the once-extensive Zanzibar-Inhambane lowland forests. Kaya Kinondo is isolated; the nearest remnant forest is about 6km away. The forest contains three habitats, each dominated by a different set of trees, including rare and endangered species (Edwards, 2008). Kindondo contains two endemic bird species, a threatened bird species, and the threatened black and white colobus monkey (Kihima and Kimaru, 2013).

With their link to the past and traditional ways of knowing, the makaya became symbols of resistance to colonial rule. The British sought to crush these symbols, and thus destroyed one of the makaya, Kaya Giriama, in 1914 (Nyamweru, 1998).

This episode is part of a long history of colonization and land dispossession in the coastal region, leading to distrust of the national government, foreign investors, and immigrants from the rest of Kenya (Nyamweru, 1998; Kihima and Kimaru, 2013). This sense of alienation from the rest of Kenya is illustrated by a local political group's slogan "Pwani si Kenya',' which translates to, "The coast is not Kenya" (Goldsmith, 2011; quoted in Krijtenburg, 2013). This region is on land designated primarily as 'trust' (according to the old constitution) or 'community' land (as of the 2010 constitution) (Beja, 2012). Therefore, disputes over land are more about *access* rather than *ownership* (Krijitenburg, 2013).

However, as more and more land around the kaya forests has switched from communal to private, and as the population has grown, there has been increased pressure to appropriate the still-communal kaya forests (Nyamweru, 1998). People also extract resources from the forests, including wood, water, livestock pasture, herbal medicine, and animal products (butterflies, snakes, honey) (Kihima and Kimaru, 2013). Furthermore, the ~ 100 m strip between the Kaya Kinondo and the ocean is contested between the Digo People, fishermen, peas-ant farmers, local traders, and outside business interests centered around beach tourism (Nyamweru, 1998).

However, the makaya have increasingly been recognized for their cultural and ecological importance, and have attained more protection and power. Even nationally, the makaya and community elders hold substantial political power, and politicians often seek to highlight, exaggerate, or even fabricate their personal connections to a kaya (reviewed in Nyamweru, 2012).

Kaya Kinondo is still an important site for prayer, ritual (Yuji et al., 2005), rites of passage (Wanza and Njuguna, 2012) and connection to ancestors (Barasa, 2007), and holds medicinally and culturally significant plants (Brantley, 1979). For example, Kaya Kinondo contains the tomb of Nkomboza, the ninth-generation female ancestor of the senior elder (as of 1998). The tomb is especially sacred because the Digo People are matrilineal, unlike other Mijikenda (Nyamweru, 1998). The Kaya contains many sites with particular sacred meanings and rules about who can access them, and for what purposes (Wanza and Njuguna, 2012). However, other community members, especially young people, view the kaya and traditional practices negatively (Nyamweru, 1997).

Over the last several decades, Kaya Kinonde has received additional protection and designation. In 1992, many makaya were listed as national monuments by the National Museums of Kenya under the National Museums and Heritage Act (Githitho, 2016). To support the conservation of the makaya, the National Museums of Kenya launched a special body, the Coastal Forest Conservation Unit. This new unit received funding from the British Overseas Development Authority and the World Wide Fund for Nature-UK and worked with makaya elders to conserve the makaya (Nyamweru, 1998). This brought new legally-binding conservation laws, but these had little effect, in part because, "local people would never prefer to conserve the forest protected by the government" (Yuji et al., 2005, p. 9). In 2008, the site received further recognition: it was added to the UNESCO World Heritage list.

In 2001, the community initiated an ecotourism project (Kihima and Kimaru, 2013). The project had two goals: for conservation: "[W]e should respect our tradition and save it from being abandoned, and should conserve kaya forest from disappearing." (Yuji et al., 2005, p. 9). The ecotourism project recognized that

by bringing in financial revenue, the project would enable more conservation: “We say that hungry people cannot conserve” (Yuji et al., 2005, p. 12).

The creation of the ecotourism project followed a deliberative, majority-consensus process which included both elders and younger generations (Yuji et al., 2005). The project recognized that it would bring about a change in the forest and that tradition is dynamic: “We are no more in the age of our ancestors.And they say that tradition is dynamic; it is not at a stand still like a tree” (Yuji et al., 2005). Kaya elders were substantially involved in forming the project (Kihima and Kimaru, 2013). Local townspeople were only partially aware of the project objectives (27 % of a random sample were unaware) (Kihima and Kimaru, 2013). Elders had the final say on whether to initiate the project, and some elders objected to the welcoming of tourists into the sacred kaya (Bbeja, 2008). However, following the sense of a dynamic tradition, they did agree to open Kaya Kinondo to foreign tourists (Yuji et al., 2005), but only when accompanied by a guide (Sinamai, 2014).

The Kaya Kinondo ecotourism project is administered by a community organization, the Kaya Kinondo Conservation and Development Group (KKCDG). The group includes representatives from each of the surrounding villages. The KKCDG is in turn monitored by a council of elders (Kimaru, 2000). Constitutionally, the organization is required to have regular open meetings to engage with local people. However, these meetings rarely happen, and many people are not invited or welcomed. Partner organizations, including the World Wildlife Fund and the National Museums of Kenya were forced to intervene.

The KKCDG is regarded as opaque and nepotistic (Kihima and Kimaru, 2013). Most people were unaware that the KKCDG has a constitution (Kihima and Kimaru, 2013). Even though the constitution was supposed to be ratified by the community, it never was (Kihima and Kimaru, 2013).

THE KKCDG is responsible for receiving funding requests from various local actors and deciding which to fund, and for how much (Kihima and Kimaru, 2013). Though on paper there is substantial deliberative democratic power to run the project, in effect the KKCDG has acted relatively independently from the community (Kihima and Kimaru, 2013).

Some foreign investors hold that conserving the makaya is stopping progress and hurting jobs (Turnbridge, 1996). The continued conservation of Kaya Kinondo demonstrates that these pro-development values have not been privileged. However, some locals believe that protecting the kaya forests is a form of land grabbing: "Mdudu [the conser-vation fieldworker] put a fence across my land and now I have nowhere to farm and my children have nowhere to build. I told him not to put the fence so close to my place but he did so all the same. Where do you think I am going to cultivate when it rains; I feel a lot of sorrow in my heart but there is nothing I can do and what can I do for my chil-dren? I have no land now; all I can do is go around begging people for a place to cultivate" (interview with Kaya Teleza, quoted in Nyamweru, 1998).

Others saw the Kaya as a tool for elders to maintain control: “The council of elders ‘decreed how the Kaya forest could be used, which trees could be cut and why, what herbal and ritual plants could be gathered,

how close cultivation could come to the forest edge'" (Robertson 1993, p. 2, quoted in Nyamweru, 1998). Still others recognize that the Kaya is essential: "it is part of our culture" and "the trees help to attract rain" (Nyamweru, 1998, p.22).

The project seems to have been successful in advancing conservation. Manbugu and Onywere (2011) used satellite data to show that the forest decreased by 8 ha between 1986 and 2003, but in 2003-2008, it did not contract. Through surveys, community members agreed that the tourism project helped to mitigate forest loss (Kihima and Kimaru, 2013). This conservation is partially because the tourism project employed a security guard, and the increased human presence in the area made illegal resource collection more risky (Kihima and Kimaru, 2013).

Scholars have suggested that Kaya Kinondo ecotourism project could serve as a model to conserve other makaya that have seen extensive loss of forest cover (e.g., 50% loss in Kaya Rabai) (Kibet and Nyamweru, 2008). The project has been identified as a successful case of Indigenous Knowledge Systems and ecotourism principles working together (Barasa, 2007).

The project increased protection of the forest, which was seen as threatened by immigrant farming, reflecting fears from the long history of oppression of the Mijikanda People by colonialist Britain and other ethnic groups (Kihima and Kimaru, 2013).

The ecotourism project has changed the way people interact with the forest, and their relationships to it. Even as the project supported forest conservation, it led to a decrease in culturally-significant ceremonies. According to the official ecotourism project rules, these ceremonies can only be initiated by the council of elders, who did not initiate any ceremonies for an extended period (Kihima and Kimaru, 2013). Nonetheless, a large majority of random community members felt that the project had increased their connection to the forest (especially women, who felt that their close association with the forest had become more normalized) (Kihima and Kimaru, 2013). Furthermore, a majority felt that the project had had a positive impact on their culture and led to greater recognition of traditional cultural practices relating to the forest (Kihima and Kimaru, 2013). However, community members also reported that after becoming an ecotourism destination, there was an increased focus on monetizing over conservation (Kihima and Kimaru, 2013).

The project has kindled a relationship of belonging with the Kaya. Before, "when the forest belonged to the government, and not to people. And the government officers came with whips to beat local people for punishment. The problem is that the local community has not regarded the forest as their property so long as the government is concerned with its conservation. They began hating government policies for conservation" (Mr. Kimaru, quoted in Yuji et al., 2005).

"But in the case of Kaya, people are told that the forest is theirs, things are quite different. They will conserve themselves, and they will report if they find destruction. We will no more need policemen to guard the forest" (Mr. Lumumba, quoted in Yuji et al., 2005).

The project has also increased Indigenous sovereignty over infringements of Kaya protection, and privileged the power of the traditional council of elders. If someone is found violating the rules of the Kaya, "[It] is not so important as to bring the person to the government court; we simply bring the person to the traditional council of elders. Elders give judgment and advice not to repeat what the person committed" (Yuji et al., et al., 2005).

The ecotourism project entrenches traditional cultural standards and values, particularly those held by elders. Visitors must engage with the forest as the community sees fit, rather than in a way that is convenient for the visitors (Okech, 2011). For example, the visitation hours follow the traditional Digo calendar (Yuji et al., 2005). The park rules embed standards about what women may wear, e.g., the visitation rules include: "Short clothes of women are not accepted" (Yuji et al., 2005)

The tourism project has been moderately successful economically. In 2010, the tourism project had revenues of Kshs. 509,686.00 (US$ 6,371). However, 72% of this income was required to offset costs, with 15% going to savings, leaving only 13% for communal support. Nonetheless, 84% of randomly selected community members reported receiving communal benefits from the project in small grants, mostly for education, religious ceremonies, and water provision (Kihima and Kimaru, 2013). A smaller number of people benefited individually from the project, with 25% reporting direct cash income (Kihima and Kimaru, 2013).

Beyond the fees paid by tourists,the ecotourism project has created a market for local products, such as honey and herbal beauty products (sinamai, 2014). The project also united people from the different villages surrounding Kaya Kinondo, especially women. The project provided women greater access to markets and credit and created institutions to help them attain sellable skills (Kihima and Kimaru, 2013). A community bank, the Kinondo Village Bank was created to make the ecotourism gains accessible to the community (Sinamai, 2014).

There remains a rift between the traditional beach tourism destinations and Kaya Kinondo ecotourism. There is little cooperation between various tourism outlets; the large hotels and beach-front destinations remain popular, but they have little connection to places like the Kaya Kinondo ecotourism project: This disconnect is the chief challenge, and biggest opportunity, to the future economic success of the ecotourism project (Schianetza, Kavanaghb, and Lockingtona, 2007).

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ICCA Case Study: Górale Sheep herders of the Tatra Mountains, Poland

Agnes Pawlowska-Mainville

This case study illustrates one local communities' cultural practice of sheep herding in the Tatra National Park (Tatrzański Park Narodowy). I ask the following questions:

1. What values are articulated in ensuring this space is ecologically in-tact? What values articulation methods are used?

2. In what contexts are other than local values included attaining sustainability (sustainable outcomes)?

3. How is the plurality of values (including perspectives, beliefs, rules) working in this context well? What are the shortcomings/gaps? Who is excluded from decision-making?

4. What does the literature say about the benefits and shortcomings of this park designation as a protected space and as a cultural space of the 'Gorale' (Highlanders) in Poland?

Methods

This research was carried out in the Polish language because English misses out the nuances of the cultural elements, including ethnonyms and research pertaining to a specific local community-practice. I relied on Google scholar and used combination of keywords: [tatrzański AND/OR gorczański] park narodowy AND górale AND wypas AND/OR owiec AND/OR pasterstwo (66-191 results) (only 32-60 result were given and not all applicable if the terms were in English: Tatra national park AND highlanders AND sheep herding; result numbers were changed if the writing used polish lettering as well). The case study was used as it represents IPBES description of a local community: the Gorale or 'Highlanders' are one of the ethnic minorities of Poland and they reside in different mountain ranges in Poland. They are identified as one of numerous national ethnic and minority groups of Poland whose subsistence economy is based on sheep herding. The Górale/Highlanders discussed in this case study live in the vicinity of the Tatra and Gorce mountains.

Background

The Górale are a group that underwent different political structures, land changes and diverse forms of resistance that came with the general colonization of Poland including the by Austrian Empire (1769), World Wars One and Two (1914-1918; 1939-1945 respectively) and the effects of socialism under during the communist era. Mining and metallurgy were pursued over many centuries (from the 15th century until almost the end of the 19th century) and the influx of development and tourism in the 20th Century has also impacted the local culture, as did contested form of land title that led to feudal bourgeois land systems and massive expropriation of Gorale for the purpose of 'environmental protection (Borucki 2004). Largely due to the deforestation that occurred in the territory by the Nazis occupation of Poland and Currently, a

large portion of the Tatra Mountains has been designated as a National Park (1955-), and of the Gorce Mountains as the Gorce National Park (1981-) sheep herding by the local people has been permitted once again. Forced displacement, dispossession and outlaw of herding in the region was seen as a way to break from privatisation of 'pastoral halls and herding pastures', ecological impact and anti-peoples' republic vision of the State: "unorganized and excessive grazing of sheep and other animals farms in the Tatra National Park leads to a gradual destruction of the Tatra vegetation and impoverishment of the landscape. Pasture it is associated with the existence of numerous and fragmented private property in the area Tatra Mountains and exercising servitude" (quoted in Wrobel 2006, translated by the author).

Protected Highlander cultural landscapes

The social values are directly tied to the land here. Social values shifted with the changing land title: hunting, grazing, fishing, renewable-resources rights existed in this region and specifically for the Podhale inhabitants, as royal subjects, other freedoms were asserted in the mountains. The 1769 Partition of Poland saw the land shift to privatization and high influx of tourists in the 20th century saw the region's economy grow from one of the poorest areas of Poland to a region of affluence. The local economy was largely based on a subsistence and farming lifestyle but also carpentry and working with wood (tools, churches, houses, artisanal crafts) and cloth-mathing led to extra income for the local communities. Until today, the main source of income for the local population was animal grazing and husbandry, and above all sheep mountain pasturing combined with cheese making at shepherd chalets (etnozagroda 2018; Misinska; Borucki). Hereditary grazing rights were bound to the farmer's homestead however sheep pastures across the mountains were usually a communal property. Seasonally used shepherd chalets in the high mountains were used for days at a time and were considered communal property as all sheep herders had right to access these huts. Professional sheep farming was a male-dominated activity; cow grazing was a female activity. Passed down from generation to generation in some families, sheep herding was considered important and influenced almost all spheres of the traditional Podhale lifestyle, ranging from clothing to food, folklore and arts.

Even in contemporary times, local architecture is reflective of the land: vaulted spruce log homes whose gaps are filled with moss and wool shavings; highly decorated wood carvings still surround the roof sometimes covered with straw (and metal to-day); to protect them from mountain winds, the houses were carefully placed, sometime farmsteads arranged in a quandrangle, the so-called *okolicne obory*, or *okoły* enclosed with a sturdy fence and a gate. Traditionally a "black" room (with a chimneyless stove for a long time) and a "white" one were part of the house, when wooden stoves were the main source of heat and the smoke coloured the walls black. The clothes too, reflect the local herding culture: Young shepherds also used to wear amulets and shirts of the shepherds were "impregnated" with sheep's butter. Most of the outfits are made of sheep, thus reflective of the herding practice: woollen pants with a traditional parzenica, a heart-shaped pattern of a traditional handicraft characteristic of the region and embroidered on the upper front side of men's trousers, was present. The parzenica is a heart-shaped pattern of a traditional handicraft characteristic of the decorative art of the Polish highlanders, often found embroidered on the upper front side of men's trousers.The parzenica represents the dziewięć sił"(nine strengths), a common name for the mountain plant Carlina acaulis. The plant was considered to

have nine strengths that give a human being nine human strengths (Health, Power, Mind, Courage, Honesty, Faithfulness, Diligence, Scrupulousness, Sacrifice (Zdrowie, Moc, Rozum, Odwaga, Uczciwość, Wierność, Pracowitość, Sumienność, Ofiarność translated by the author). The plant used to be blessed nice times and was said to be nine times stronger than any other medicine (Fischer). The plant is also heavily associated with treated the plica polonica (Polish plait) condition for the blessing the cows and sheep so that the milk is yellow. The number nine here is significant as the powers of heaven, hell and earth are multiplied thrice and hence the parzenica to this day, is an example of the strong bond between humankind, and heaven and earth.

Apart from traditional dress, customs and culinary skills, the practice of sheepherding is an occupation shaped over the centuries. Such land use has a long history in the Carpathians, while the pastoral halls are private, the baca (main sheepherder) grazes his own sheep as well as those of friends and families. This made it possible to use even high mountain halls for production. Indeed, what forms the natural and cultural landscape in these regions is sheep-herding, a cultural practice that is continued to this day. Sheepherding is associated with many cultivated traditions including the ceremonial commencement and closing of the herding season (Molik et al 2017; Ceklarz, n.d.). The arrival and the departure of sheep into the pastures called ‘redyk’ is preceded by a solemn ‘bacowska’ mass during which sheep are blessed with water and smudged, which is to bring good luck and prosperity throughout the grazing season. The smudging is also a ritual used to ‘cleanse’ the sheep and remove any bad omens. During the grazing season, other pastoral customs are cultivated, including the reliance of shepherd dogs, the use of traditional tools and shacks, and the creation of lactose products including the local cheese, milk, clothing, and artisanal crafts. The herders (baca), and his apprentices (juhasi), are considered healers and knowledge-holders and their position as sheepherders are passed on from generation to generation.

Sustaining community grazing is an important element of landscape protection. Cultural grazing prevents negative changes in flora and degradation of architecture, and moreover contributes to economic activation of mountain regions. Studies indicate that that sheep grazing is beneficial for the preservation of biodiversity and landscape values in the Gorce National Park (Molik et al 2017; Cabarelo et al 2007; Mroczkowski 2006; Molik 2015; Molik et al 2005). For centuries, sheep have made an invaluable contribution to the immediate environment. They participate in shaping the biological balance: they can use pastures of lower quality, at the same time making the landscape and the immediate surroundings more attractive (Mroczkowski 2006). Sheep grazing itself, as an organized production activity conducted in herds, creates interesting and valuable landscape accents.

The pastoral economy is conducted in accordance with the regional tradition and culture. Traditionally, according to customary law, the pastoral economy existed through the oscypek (the regional goat-milk piece of cheese) (Ceklarz, n.d.; Wrobel 2013). The cheeses served as "tender" between shepherd and its contractors, hence the importance of the method of their production by herding in the first place was key (Kopiczyńska-Jaworska 1969 quoted in Wrobel 2013).This form of economic activity existing for several hundred years within pastoral families can be considered pastoral common law coexisting within the mountainous landscape.

Cultural or commercial and cultural grazing, organized in accordance with the ethnographic heritage and tradition, is a special form of primary human economic activity, which is attributed to a given region. Sheep grazing and the use of milk products (especially cheese) to produce regional items is a form of economic and cultural revitalization of the region (Ceklarz, n.d.). Grazing is an additional tourist attraction and enriches the landscape values of mountain areas, as well as contributes to the progress of tourism development, for which it provides the main food or ethnographic products, such as watra, redyk, etc. Benefits from grazing are also achieved by the local population, i.e. farmers - farmers who obtain income from the sale of lambs or processing wool, while shepherds - shepherds obtain income from the sale of sheep's milk processing products, ie oscypek, bundz, redykołek, etc. (Ceklarz, n.d.).

In conclusion, Cultural sheep herding that has returned to these areas now forms a part of the Gorale cultural landscape, and after years of dispossession from these regions, and prohibition of herding, now serve as testimony to the maintenance of regional customs and traditions, and thereby helps to preserves regional identity (Borucki 2004). Grazing over the 'pastoral halls'is a natural form of landscape conservation and economic activation of the region. The local values: that continued cultural sheepherding in the protected areas will persevere, are embedded into the local practices. Traditions surrounding the 'scaredness' of the practices and the natural symbolism are instrumental to the local culture and the existence of the land-based society here. The significant role of herding has had a positive impact on the environment and local parks authorities are continuing to work with Gorale sheep grazing practitioners to better ensure sustainable economic development of the region.

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ICCA Case Study: Tla-o-qui-aht, Canada

Agnes Pawlowska-Mainville

In examining the values expressed by the Nuu-chah-nulth Indigenous people in their decision processes related to 'outcomes' for their Indigenous-protected space, I ask the following questions:

1. What values are articulated in ensuring this space is ecologically in-tact? What values articulation methods are used?

2. In what contexts are other than local Indigenous values included attaining sustainability (sustainable outcomes)?

3. How is the plurality of values (including perspectives, beliefs, rules) working in this context well? What are the shortcomings/gaps? Who is excluded from decision-making?

4. What does the literature say about the benefits and shortcomings of this park designation as an ICCA and Tribal Park?

Methods

Working within an Indigenous issues context is challenging as many different names are used to Identify someone as 'Indigenous' and term like Aboriginal, First Nations, native are used in the literature still, including numerous diverse ethnonyms. To provide an example of an Indigenous-focused case study, I used keywords on Google scholar and academic databases (JStor, Wiley, Proquest and Project MUSE as well as the Bibliography of Native North Americans). A combination of keywords were used: Indigenous AND values AND outcomes AND Aboriginal AND First Nations AND plurality AND (1) [Indigenous] Community Conserved Areas (2) Tribal parks. Because very few Indigenous people would discuss their environmental philosophy as 'outcomes' and their knowledge and practices as '[plural] values' I have also explored articles that used terms such as 'effectiveness'(from PAME) and 'management effectiveness tracing tool' (METT) 'knowledge co production' or 'co-management' and 'governance' respectively. A combination of the keyword searches consistently provided me with about 15 000-19 000 responses (on Google Scholar), with most references on ICCAs identifying the different ICCAs present across the globe. The most common and numerous cases were on Tla-o-qui-aht.

Tribal Parks and the Tla-o-qui-aht Indigenous Protected Space

Taken as a proactive way of protecting land under First Nations leadership, since the 1980s, Tribal Parks have been declared by First Nations based on the idea that knowledge is embedded on the land, much like the reliance of people on the resources for their livelihood. Wah-nuh-jus Hilth-hoo-is (Meares Island), near Tofino in Clayoquot Sound was declared a Tribal Park by the Nuu-chah-nulth in 1984 as a response

to proposed clearcut logging. Referring to the Macmillan Bloedel logging company which in 1984 announced plans to clear-cut most of Meares Island, the movement associated with Tribal Parks indicates that within the borders of such parks, it is local people who govern what happens to the land and all resources of that land by classifying designations and conducting all monitoring and any restorations. Since then, Ha'uukmin, Esowista, Gwaii Haanas and Dasiqox in the Tsilhqot'in Nation in Canada have been declared as Tribal Parks in British Columbia. Protecting traditional territories while also maintaining the continuous assertion of Indigenous sovereignty and law, Tribal Parks enable Aboriginal people to take on the leading role in the stewardship of protected areas on ancestral lands.

Customary Governance

Although these parks are not officially recognized by the provinces and by Parks Canada, these declarations parallel with Aboriginal rights and title in British Columbia as well as with the view that Indigenous people have the ultimate decision-making authority within their ancestral territories. In fact, many of the communities involved in Tribal Parks have affirmed that these declarations do not need recognition; it is within their inherent rights and jurisprudence to make decisions regarding the use, zoning and any other activities on their traditional lands and watersheds. In this view, because State sovereignty is not up for negotiation, recognition can only go so far (Turner 2006). At the grassroots level, Tribal Parks provide the space and discourse for an exchange of ideas, experiences and knowledges about land and resource governance in the context of sustainable livelihoods. Based on the idea of no surrender of customary governance over the land and resources (as well as land in some cases), nuances of Tribal Parks exist through diverse First Nations-led initiatives of sustainable development, also known as Indigenous Peoples' and Community Conserved Territories and Areas (ICCAs).

The international framework identified as Indigenous Peoples' and Community Conserved Territories and Areas (ICCAs) are similar models to Tribal Parks; both are founded on Indigenous governance as the key mechanisms for the conservation of biological and cultural diversity. The three defining characteristics of ICCAs are based on the fact that (1) a people or community is closely connected to a well-defined territory, area or species because of livelihood, historical and/or cultural reasons; (2) the community is the major player in governance and implementation of management strategies and hence is the decision-making body; and, (3) community stewardship, decisions, and efforts at conservation of the territory and its associated values may be related to material livelihood, water security and safeguarding of cultural and spiritual places (adapted from ICCA Consortium 2016). As of 2020, more than 500 member organizations in more than 80 countries are ICCA members, with most of them being Indigenous communities. Basically, Indigenous Peoples' and Community Conserved Territories and Areas are "natural and/or modified ecosystems containing significant biodiversity values, ecological services and cultural values, voluntarily conserved by Indigenous peoples and local communities, both sedentary and mobile, through customary laws or other effective means" (IUCN 2014). ICCAs acknowledge the socio-ecological relationship between Indigenous people and their ancestral lands to mean the customary governance by local communities.

While the 'legitimacy' of ICCAs are rooted in the values and meanings they possess for those most directly concerned, they are not officially legislated in Canada. There are currently no policy and no frameworks

at the federal level to effectively declare ICCAs or CCAs for protected areas, and many [I]CCAs are largely a voluntary process. This is perhaps one of the biggest challenges Indigenous resource stewardship systems face: any initiative– be it Tribal Parks or ICCAs or other grassroots measures – often requires lots of public pressure and creative political action. And, even though many Aboriginal people in Canada view institutional recognition as unnecessary to self-determination and applicability of Indigenous laws on their own territories (often unceded), the lack of financial support and legitimization by settler-States like Canada make them interpreted to be merely aspirational.

Undoubtedly, acceptance and acknowledgement by States has been one of the main criticisms of Indigenous declarations of protected spaces such as ICCAs and Tribal Parks. The *International Law and Jurisprudence Report* (2012) for example, illustrates the impressive extent of provisions in binding and non-binding international instruments that support the rights of Indigenous and local communities over their territories, areas and resources. International organizations composed of conservation and cultural professionals like IUCN (through the World Conservation Congress), the United Nations Declaration of the Rights of Indigenous Peoples as well as the International Labour Organization through the C169-Indigenous and Tribal Peoples Convention (1989), all acknowledge the socio-ecological relationship between Indigenous people and their ancestral lands to mean the customary governance by local communities (ICCAC 2014; IUCN 2012; ILO 1989; UNDRIP 2014). Although legitimization is not viewed as a necessary- or even appropriate - component required by those working within the realm of areas protected by Indigenous people [Tribal Parks Gathering 2016]), nevertheless, like other international mechanisms including UNESCO conventions, ICCAs and Tribal Parks have yet to obtain legal status within colonial contexts and settler-States. In Canada, at present, there are only "some comprehensive agreements [that] allow for voluntary set asides of land for protection by Indigenous People" but these areas are governed according to standards established by Canada (ICCA 2008 quoted in Wilson et al 2012: 11). Largely due to unresolved land-claims and Canada's fiduciary duty to Aboriginal people and their rights which, when examined through arrangements such as ICCAs or Tribal Parks, would broaden in scope. Because they are founded on intellectual traditions and customary governance over land and resources, ICCAs and Tribal Parks could certainly become instruments for strengthening the current Aboriginal and treaty rights and title discourse.

Like Tribal Parks, Indigenous Peoples' and Community Conserved Territories and Areas represent more than title to land; they characterize Indigenous spaces, including the land and resources within a traditional territory as places looked after – governed – by local peoples. In the Nuu-Chah-Nulth territories, local governance is based on Nuu-Chah-Nulth values and knowledge exchange occurs through Tribal Parks Gatherings and meetings with other communities, Nations, activists, and scientists. Tribal Parks chronicle new conservation thinking within the establishment of Indigenous protected, managed and governed areas.

Because they are founded on traditional teachings and incorporate sustainable economics into Indigenous self-determination, Tribal Parks present a template for the articulation of local values in protected areas management. They also reaffirm distinct Indigenous stewardship systems. Tribal Parks therefore, serve as a rights-based mechanism upholding the practices of Living Heritage. Because Indigenous Peoples' and

Community Conserved Territories and Areas as well as Tribal Parks can include ecosystems with minimal to substantial human influence as well as cases where manifestations of traditional land-use patterns are evidenced by local communities, these Community Conserved Areas (CCAs) are considered to be an interdependent relationship of people to their ecosystems. Spearheaded by the Union for the Conservation of Nature (IUCN), the world's oldest and largest global environmental organization, Community Conserved Areas and their Indigenous Peoples' and Community Conserved Territories and Area (ICCA) counterparts, signify places where local people play a major part in the conservation decision-making of the habitats, species and ecological services associated with cultural values (Philips and Harrison 1999; IUCN 2010).

Nuu-Chah-Nulth values exist through the peoples' relationship with the watershed. The importance of that land-people relationship cannot be denied, and effective means to protect natural areas that foster cultural identity of land-based Indigenous people of those areas is essential. Because Indigenous people are dependent on their 'backyard' for cultural activities and livelihoods, supporting Indigenous customary governance and Aboriginal rights would actually advance, rather than diminish, conservation outcomes. As the biggest stakeholders, it is in local peoples' self-interest to protect local resources; as rights-holders, Indigenous community conservation initiatives incorporating cultural heritage and values within a contemporary stewardship framework must also be respected and recognized.

Recognizing a community's relationship to their territory in a unique way that is inclusive of ecological intactness, sustainable economics, and customary law, Tribal Parks have the potential to pre-emptively protect Indigenous landscapes through local stewardship practices and diversified economies such as harvesting, food sovereignty and eco-tourism for which there is high demand (Higgins-Desbiolles 2009). In conjunction with the assertion of Aboriginal rights and title in Canada, Tribal Parks are an approach that fosters cultural identity and reconciles Indigenous philosophies with socio-economic sustainability. Unlike the classic idea of parks where nature is conserved and humans are removed for the protection of the natural spaces, Tribal Parks are viewed as mechanisms for sustainable livelihoods and Indigenous planning of protected areas. This land is our garden" the Tla-o-qui-aht then-chief Moses Martin said. Serving notice that Nuu-chah-nulth lands and resources should be respected the Chief continued, "You are welcome to come ashore and join us for a meal, but you have to leave your chainsaws in your boats. This is not a tree farm – this is Wah-nah-juss Hilth-hooiss, this is our Garden, this is a Tribal Park" (quoted in Ha-Ahilth-Sa 2017).

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