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Sasi and Marine Conservation in Raja Ampat, Indonesia

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Raja Ampat, Indonesia, possesses the greatest diversity of corals and reef fishes on the planet. The area is a priority for marine conservation for the provincial government, local communities, and major international nongovernmental organizations such as The Nature Conservancy and Conservation International. Traditional marine resource management practices in the region, referred to as sasi, have the potential to support conservation objectives. This article contends that while traditional marine resource management systems may support conservation, they must be reinforced by a supportive social structure and governance system to remain relevant in a rapidly changing world. Two villages in Raja Ampat were studied to gain a better understanding of sasi and how this practice has been affected by cultural, political, and economic change. These villages illustrate how the role of religious authorities, access to alternative livelihoods, proximity to urban centers, and capacity for monitoring and enforcement may influence the effectiveness of marine resource management systems. Our research suggests that the continued relevance of sasi in marine resource management relies on the support of influential local leaders and businesses and government regulations that reinforce traditional resource use practices.

Keywords customary marine tenure, marine conservation, Raja Ampat, *sasi*

Introduction

The marine environment is increasingly threatened by overexploitation of marine resources. About 70% of all fish stocks in the world are overexploited, suggesting that the global maximum potential for marine capture fisheries has been reached (FAO, 2004). Scientists

We thank the people of Raja Ampat, including the village leaders, for allowing us to work in their communities. We thank Elisabeth Pasapan and Lukas Rumetna for their invaluable contributions with data collection. We acknowledge the many villagers in Raja Ampat who contributed to this research, especially Abdul Soltief, Muhammad Noch Soltief, Stevanus Faam, Andreas Mjam, and Dian Boeng. We acknowledge the Nature Conservancy's Raja Ampat field team including Anton Suebu, Yohanis Goram, Nita Wartiantini, and others for their guidance, technical support, and good community relationships, without which this research would not have been possible. Finally, we thank the anonymous reviewers who provided thoughtful comments on this article. This research was supported by the Nature Conservancy and the University of Hawaii.

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and conservationists are struggling to address the global fisheries crisis, and management strategies are desperately needed to protect remaining fish stocks and the millions of coastal people who depend on this resource for food. Local marine management strategies, specifically customary marine tenure systems, have been introduced as one means of responding to this crisis (Ruddle & Johannes, 1985; Kuemlangan, 2004). Customary marine tenure (CMT) is defined as the ways in which fishers “perceive, define, delimit, ‘own,’ and defend their rights to inshore fishing grounds” (Ruddle & Akimichi, 1984).

This research is essential because major international conservation organizations such as the Nature Conservancy and Conservation International are working with local governments and communities in Raja Ampat to conserve the incredible marine biodiversity in the region. Understanding and engaging with the existing customary marine tenure practices may help conservation managers ground their efforts in local environmental and cultural contexts (Berkes et al., 2000), thus increasing the likelihood of achieving conservation objectives.

Role of Sasi in Marine Conservation

The potential of customary marine tenure systems to support conservation objectives and avoid resource degradation has stimulated a significant amount of research interest (e.g., Johannes, 1984; Ruddle & Johannes, 1985; Aswani, 1998; Lahn, 1998; Lam, 1998; Hamilton, 1999; Hamilton & Walter, 1999; Johannes & Lam, 1999; Johannes & Hviding, 2000; Johannes, 2002; Aswani & Hamilton, 2004; Kuemlangan, 2004; Drew, 2005). This article will add to this growing body of knowledge by investigating a customary marine resource management system known as *sasi*, which is practiced in the Indonesian islands of Raja Ampat (Figure 1) and across eastern Indonesia (Zerner, 1994a; Mantjoro, 1996; Pannell, 1997; Thorburn, 1998, 2000; Harkes & Novaczek, 2002).

Sasi refers to a traditional system of natural resource management and includes prohibitions on resource harvest on land and in the sea. *Sasi laut* (marine *sasi*) describes specific rules and regulations governing access to fishing areas, fishing gear, target species, and the time and location of harvests (Bailey & Zerner, 1992; Ruddle, 1994). *Sasi laut* also incorporates a set of institutional roles with varying degrees of influence wielded by religious and government authorities (Zerner, 1994a).

Sasi incorporates many elements that are representative of “best practices” in modern marine planning and management frameworks such as participation, flexibility, and adaptability (Bailey & Zerner, 1992). Studies of *sasi* in Indonesia have demonstrated that villages with *sasi* are more active in managing marine resources than those with no *sasi*, suggesting that the presence of *sasi* is positively correlated with the potential for development of modern marine management strategies (Novaczek et al., 1998; Harkes & Novaczek, 2002; McClanahan et al., 2006; Cinner et al., 2007).

Management concepts and potential conservation strategies inherent in *sasi* include open and closed areas and seasons, community tenure rights over an area, limiting access to resources, controlled harvest and distribution of benefits, and locally developed and agreed-on regulations (Harkes & Novaczek, 2002). *Sasi* has been viewed as ensuring fair and equal access to resources, the sustainable management of sedentary marine species, subsistence requirements, and a continuous income (Bailey & Zerner, 1992; Pannell, 1997). *Sasi* also includes a realization of the value of maintaining the relationship among the community, supernatural powers, and the environment. Because of the demonstrable benefits to society, embodiment of principles underlying modern fisheries management, and its potential to



Figure 1. Map of Raja Ampat Islands, Indonesia.

conserve marine species and habitats, *sasi* provides an important mechanism to support conservation.

The limitations of traditional resource management systems such as *sasi*, however, must be recognized. The effectiveness of *sasi* is currently limited by a lack of adequate enforcement capacity including boats and staff, by poaching undertaken by outsiders who do not follow local traditional regulations, and by the erosion of traditional practices and authorities. Further, *sasi* is unlikely to effectively support pelagic species or highly migratory species; the small areas of managed coral reefs are inadequate to protect the larger fisheries unless these areas happen to be critical spawning or nursery habitats.

Critics of the value of customary marine tenure's role in modern conservation strategies suggest that Western and indigenous concepts of nature are too different to be built together into a coherent conservation strategy (Dwyer, 1994). Finally, researchers have questioned whether customary marine tenure systems are worthy of protection because they may be

overcome by modernization (Polunin, 1984); or some may be too inefficient or subdivided to result in conservation (Johannes, 1981). The decline of *sasi* in eastern Indonesia (Zerner, 1994a; Mantjoro, 1996; Thorburn, 2000; Harkes & Novaczek, 2002; Cinner et al., 2007) leads to concerns about whether the institution of *sasi* is sustainable. If *sasi* is not sustainable, then the value of building it into developing conservation strategies is questionable. To explore this further, this study investigates both the nature and evolution of *sasi* and factors affecting its ability to support future conservation strategies.

Methods

Fieldwork was conducted in 2006 in the villages of Tomolol and Fafanlap in Misool, Raja Ampat (Figure 1). These villages were selected because of economic and cultural differences that have been shown to have an impact on the effectiveness of customary marine rights systems elsewhere in Indonesia (Pannell, 1997; Harkes & Novaczek, 2002). Research techniques included participant observation, surveys, semi-structured interviews, and archival techniques. All surveys were conducted in the Indonesian language on topics including traditional marine resource knowledge, fishing practices, perception of ecosystem conditions, abundance and distribution of key marine species for food and income, threats to marine resources, and the evolution of customary marine tenure.

Oral histories were recorded to provide context for discussions of environmental change and included descriptions of demographic changes, migration patterns, and environmental history. Sixty surveys were completed (30 in each village) with an equal proportion of men and women. Although the population in Tomolol (200) is less than in Fafanlap (800), it was only possible to complete 30 surveys in each village due to time constraints in the field. The initial list of survey participants was randomly selected from a census conducted by the Nature Conservancy. Both the survey and the list of survey participants were discussed with village leaders prior to conducting the research. If a selected individual worked outside the village and was unavailable (as identified by the village leader), a replacement name was randomly selected. Surveys were conducted with young (18–34 years), middle-aged (35–55 years), and elderly (older than 55 years) men and women. Prior to each interview, the survey participants were told that their names were shared with the village leader, and confidentiality procedures were followed (i.e., the objectives of the research were outlined, the way that the results were going to be used was discussed, the participants were told that participation was voluntary, a local contact number was provided for reaching the investigator, and their responses were kept confidential). In-depth interviews were also conducted with eight key informants who possessed detailed knowledge of marine resource use and customary marine tenure practices in each community. Selection of these key informants was based on input from village leaders and community outreach staff from the Nature Conservancy who work in these communities (Halim et al., 2005).

The Study Area

Physical Environment

Raja Ampat is a group of islands off the northwest tip of West Papua, Indonesia, between 0°20'S and 2°15'S latitude and 129°35'E and 131°20'E longitude (Figure 1). The islands lie at the northeastern entrance to the Indonesian Throughflow from the Pacific to Indian Ocean, and the area includes a series of ocean currents that circulate from the tropical Western Pacific Ocean through the Indonesian Seas into the South Indian Ocean. The archipelago

rests on two continental shelves separated by the Sagewin Strait, and the shelf edges create a strong gradient from clear, open ocean to sheltered, turbid bays (Donnelly et al., 2003). Raja Ampat encompasses 4 million acres of land and sea (Donnelly et al., 2003) and includes the four main islands of Waigeo, Batanta, Salawati, and Misool in addition to hundreds of smaller islands. Climate is tropical and dominated by the southeast monsoon, which extends from May until October bringing persistent winds and swells (particularly from July through September). The northwest monsoon extends from November until March and is a period of calm with occasional strong winds and swells.

The Indo–Malay–Philippines archipelago has been described as a “biodiversity hotspot” or a center of extreme biodiversity (Bellwood & Wainwright, 2002; Mora et al., 2003; Briggs, 2005; Carpenter & Springer, 2005; Veron, 2008). In the heart of this region are the islands of Raja Ampat, which are thought to possess the highest marine biodiversity in the world (Donnelly et al., 2003). These islands contain more than 75% of the world’s identified hard coral species (Donnelly et al., 2003) and more than 1,000 identified species of reef fish (McKenna et al., 2002; Donnelly et al., 2003). Nesting populations of both green (*Chelonia mydas*) and hawksbill (*Eretmochelys imbricata*) turtles are found in Raja Ampat, and leatherback turtles (*Dermochelys coriacea*) commonly forage in the area. The incredible marine diversity in Raja Ampat makes this area both a global priority for marine conservation and a critical resource for local communities that rely on the marine resources for food and livelihoods.

Socioeconomic, Political, and Cultural Environment

Tomolol and Fafanlap are both coastal villages in southeast Misool Island. Tomolol is built on the top of a cliff with a steep path leading to the water, and houses in Fafanlap are built on stilts over the water. These villages are about 170 kilometers southwest of Sorong, which is the main administrative center for this section of West Papua. Misool Island has a total population of approximately 8,700 people with 800 residing in Fafanlap and 200 in Tomolol. The village of Fafanlap is ethnically heterogeneous with a majority of residents identifying themselves as *Ma_ya*, a group who trace their origin to the island of Waigeo located north of Misool. The *Ma_ya* also refer to themselves as *Matlol* or “people of the sea.” Islam was introduced to Fafanlap from Banda Island and 100% of villagers interviewed in Fafanlap identified themselves as Muslims. In contrast, a majority of residents in Tomolol refer to themselves as *Matbat*, a land-oriented group from Misool, who established the village of Tomolol in the mid-20th century during the war of independence between Holland and Indonesia. Christianity was introduced to Misool by missionaries from Ambon during the 1930s, and all villagers interviewed in Tomolol identified themselves as Christians. Because of their local origins on Misool Island, the *Matbat* people of Tomolol suggest that they are the true indigenous people in Misool. Many *Matbat* in Tomolol consider the *Matlol* in Fafanlap outsiders because of their origins outside of Misool.

Misool Island is part of the larger Raja Ampat Regency, which was established in 2002. Raja Ampat became an autonomous Regency as part of the central government’s attempt to devolve authority to the regions. The Regency is a local level of government that has its own legislative body and is headed by the regent (*Bupati*) who is elected by popular vote. Misool Island is divided into a series of districts, and Tomolol and Fafanlap are part of the Misool Timu Selatan (southeast Misool) district. This district is headed by a “Head of District” (*kepala Distrik*). The district is subdivided into villages (*kampung*), which are headed by village leaders (*kepala kampung*).

Tomolol and Fafanlap both have village leaders (*kepala kampung*), traditional (*adat*) leaders, and religious leaders. These community leaders control use and access to marine resources. The *kepala kampung* is an elected position whose role is to appoint staff and serves as the primary link with the higher local levels of government and the central government. Problems that arise in the village are resolved through the *kepala kampung* before they are taken to external agencies. In addition to the *kepala kampung*, each village also has traditional leaders, although their power has weakened.

The main economic activity in Fafanlap is subsistence fishing, using mostly traditional gear including fishing poles, fishing lines, three or five-pronged spears, traps, and nets. Shellfish, such as trochus (*Trochus niloticus*), pearl oyster (*Pinctada margaritifera*), and green snail (*Turbo marmoratus*) are collected by hand. A number of villagers in Fafanlap also use illegal harvest techniques such as hookah compressors, cyanide, and explosives to harvest fishes. The live reef food fish trade is active, and buyers from Sorong regularly travel to Fafanlap to collect fish for subsequent resale in markets as far away as Hong Kong. Other occupations in Fafanlap include farming, government work, teaching, village leadership, and shop-keeping, although of the adults sampled, only men held these positions (Figure 2, Table 1). Women reported making fishing nets or woven mats as a source of income. Villagers in Tomolol are predominantly sago farmers or are employed by the PT Yellu Mutiara pearl farm, which negotiated a marine lease from local clans. The farm provides economic benefits to Tomolol villagers by hiring local workers, has supplied an electrical generator to the village, paid for the construction of a large Christian church, and provides free transportation for villagers to and from Sorong. Other jobs in Tomolol include teaching, carpentry, and village leadership (Figure 2, Table 1). Based on sampling results, these occupations were only held by men. No one interviewed in Tomolol identified fishing as a primary occupation, although several villagers said fishing provides an important secondary source of income for their household. Traditional fishing gear (e.g., hook and line, spear) is common in Tomolol, and fewer illegal fishing practices are reported in this community as compared to Fafanlap.

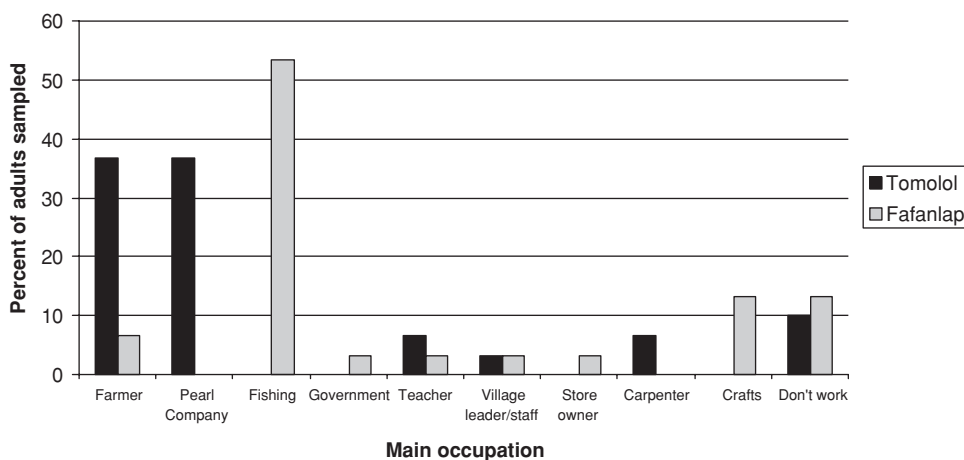


Figure 2. Main occupations of villagers surveyed in Tomolol and Fafanlap (see Table 1 for main occupations for males and females interviewed in each village).

Table 1
Main occupations of surveyed adults (men and women) in Tomolol and Fafanlap

	Males		Females		Both	
	FREQ	%	FREQ	%	FREQ	%
TOMOLOL						
Farmer	5	33.3	6	40.0	11	36.7
Pearl Company	5	33.3	6	40.0	11	36.7
Fishing	0	0.0	0	0.0	0	0.0
Government	0	0.0	0	0.0	0	0.0
Teacher	2	13.3	0	0.0	2	6.7
Village leader/staff	1	6.7	0	0.0	1	3.3
Store owner	0	0.0	0	0.0	0	0.0
Carpenter	2	13.3	0	0.0	2	6.7
Makes craft (net, cakes, mats)	0	0.0	0	0.0	0	0.0
Doesn't work	0	0.0	3	20.0	3	10.0
Total adult respondents	15	100.0	15	100.0	30	100.0
	Males		Females		Both	
	FREQ	%	FREQ	%	FREQ	%
FAFANLAP						
Farmer	2	13.3	0	0.0	2	6.7
Pearl Company	0	0.0	0	0.0	0	0.0
Fishing	8	53.3	8	53.3	16	53.3
Government	1	6.7	0	0.0	1	3.3
Teacher	1	6.7	0	0.0	1	3.3
Village Leader/staff	1	6.7	0	0.0	1	3.3
Store owner	1	6.7	0	0.0	1	3.3
Carpenter	0	0.0	0	0.0	0	0.0
Makes craft (net, cakes, mats)	0	0.0	4	26.7	4	13.3
Don't work	1	6.7	3	20.0	4	13.3
Total adult respondents	15	100.0	15	100.0	30	100.0

Evolution of Sasi in Raja Ampat

The customary rights system known as *sasi* is a set of traditional practices and laws (*adat*) that control the exploitation of natural resources throughout much of eastern Indonesia. *Sasi* is still practiced in many parts of Raja Ampat (McKenna et al., 2002; Donnelly et al., 2003) and has a long history (as in other parts of Indonesia; Zerner 1994a; Novaczek et al., 1998; Harkes & Novaczek, 2002). It has been impacted by political, economic, and social changes and has evolved from an institution governed and enforced by only traditional leaders, into an institution governed by a combination of traditional leaders, church leaders, and local government officials.

Sasi is rooted in the clan system in Raja Ampat, and villagers recognize ownership rights to marine resources based on clan affiliation. These rules are unwritten and passed down by word of mouth. The rules address which marine species can be harvested, the type of fishing gear that can be used, the timing of harvests, and yields. *Sasi* restricts the harvest of specific marine resources for a six-month period (April to September) to allow

for stock regeneration. Fishing has never been prohibited because villagers depend on fish as a primary source of protein.

Two types of marine *sasi* exist in Raja Ampat: *sasi adat* (governed by traditional law and practices) and *sasi gereja* (governed by the Christian church). Prior to the introduction of Christianity and Islam to the region, *sasi* was governed by traditional leaders and was embedded in the broader *adat* traditional law system. Authorities that reinforce and maintain *sasi* have changed as *adat* has declined in the region. *Sasi* is currently maintained by a combination of village leaders (*kepala kampung*), *adat* leaders and religious leaders who control use of, and access to, marine resources.

Penalties for breaking customary regulations are handled typically at the local level and punishment is usually determined by the *kepala kampung*. When agreement cannot be reached at the local level, local government officials are involved. Technological advances such as dynamite, cyanide, and trawling are addressed through government regulations because these did not exist when the customary law was developed. These violations are usually addressed at higher levels of government such as the district level (e.g., by the *kepala Distrik*).

Before the Indonesian government was in place, *sasi* violations were reported to the *adat* leaders. These leaders would convene and decide on an appropriate punishment. Currently, the *kepala kampung* is responsible for enforcing *sasi* in both Tomolol and Fafanlap. The majority of those interviewed in Fafanlap said that if they witnessed someone breaking *sasi*, they would notify the head of the village (*kepala kampung*) while less frequent responses included traditional leaders (*adat* leaders), police, army, or the pearl company. Those that identified the police, army, or pearl company were specifically talking about infractions involving the use of destructive fishing techniques. As in Fafanlap, most villagers in Tomolol said that they would report *sasi* violations to the *kepala kampung*, who is also an *adat* leader. *Adat* leaders in Tomolol said they worked with the Church to resolve infractions.

If someone is caught breaking *sasi*, they must pay a penalty (usually a monetary fine) to the *kepala kampung*, and this money is supposed to be used for village improvements. Zerner (1994b) also reported that village leaders in Maluku controlled *sasi* and profits were used to support village needs. However, villagers in Fafanlap said that funds collected from transgressors were not used as village income; they said that the *kepala kampung* was using the money for personal use (to pay for his son to attend university). In Tomolol, a confiscated boat from a transgressor was village property, and no one reported any concerns about the distribution of funds collected from transgressors. Additionally, some villagers suggested that *sasi* was instituted to raise money for village projects; this implies that income that was generated from resources protected during *sasi* was used for the benefit of the village. Additional research is needed to verify how income generated from *sasi* is distributed, although this research suggests that profits generated from *sasi* are more equitably distributed in Tomolol than in Fafanlap.

Evolution of Sasi in Tomolol

Villagers in Tomolol identified a variety of reasons for the development of *sasi*; the most common responses were that the ancestors instituted *sasi* to protect marine resources for current and future generations and to prevent outsiders from exploiting village resources. The village leader in Tomolol said that the ancestors would dive in the ocean to determine the status of marine resource, and based on species numbers would open or close access

Table 2
Number and percent of adult respondents who know and follow *sasi* in Tomolol and Fafanlap

	Tomolol (% sampled)	Fafanlap (% sampled)
Most villagers know <i>sasi</i>	19 (68%)	6 (24%)
Few villagers know <i>sasi</i>	9 (32%)	19 (76%)

Chi Square: $\chi^2 = 10.194$, $df = 1$, $p = .0014$.

	Tomolol (% sampled)	Fafanlap (% sampled)
Most villagers follow <i>sasi</i>	14 (52%)	1 (4%)
Few villagers follow <i>sasi</i>	13 (48%)	25 (96%)

Chi Square: $\chi^2 = 15.043$, $df = 1$, $p = .0001$.

to marine resources. Some villagers suggested that *sasi* was initiated to raise funds for a village project.

Customary rights areas are owned by the six clans that settled Tomolol, and these clans are recognized by the villagers as the original inhabitants of the village. Landmarks such as islands and mountains are used to mark the customary boundaries. Clans are responsible for monitoring and managing their customary marine areas, and the ownership rights are shared among all families in a particular clan. The clans decide when *sasi* will be instituted and what species will be subject to harvest restrictions. *Sasi* is still performed in the village of Tomolol. A statistically significant number of those surveyed in the community (>65%) reported that most people are aware of *sasi*, and most villagers follow *sasi* (>50%) (see Table 2). In Tomolol, *sasi* includes prohibitions on when marine resources can be harvested, what species can be harvested, and what gear can be used.

Sasi can be instituted when the monsoon wind blows from the south (April to September) and ends when the wind starts blowing from the west (October to March). *Sasi* usually lasts from one to three months during the stormy season and is conducted once or twice a year. Species affected can include sea cucumber, hawksbill turtle, shellfish, shrimp, and shark. Villagers reported that specific restrictions against cyanide and dynamite fishing do exist, but a combination of government laws and *sasi* regulate these activities. Transgressors are forced to pay a penalty if *sasi* is violated. Approximately one to four individuals are arrested each year for breaking *sasi* (Tomolol villager, pers. comm.) A monetary fine is the most common fine for breaking *sasi* under *adat* law, although other penalties include written warnings and confiscations of gear, catch, and boats. Several villagers stated that if a transgressor could not afford to pay the fine, the village would confiscate his boat or fishing gear until the debt was cleared. For example, Tomolol villagers currently own a Johnson boat (long boat with motor) that was confiscated from a Butonese fisherman who broke *sasi* and never paid his fine. The Church and traditional village leaders typically resolve infractions unless an agreement cannot be reached, at which time local government officials may also become involved.

Before Christianity was introduced to Tomolol, ceremonies initiating *sasi* were marked by a meeting of traditional leaders who would sit in a circle around a stone and a triton shell.

Participants took a vow to initiate *sasi* and believed that an offender would be punished by the stone and the shell if *sasi* was broken. At the completion of this ritual, participants would construct an “X” shaped marker comprised of bamboo adorned by flowers, betel nut, and leaves. This “*sasi* tree” was planted on the shoreline to signify that *sasi* was in effect, and villagers believed that sickness would strike anyone who crossed this marker to access marine resources. People chewed betel nut and lime powder, ate yellow rice and fried fish, and provided food offerings to their ancestors to mark the end of *sasi*. Traditional leaders announced the end of harvest restrictions to villagers gathered in boats along the shore.

The authority of the Christian church now plays a major role in supporting the institution of *sasi* in Tomolol, and modern interpretations of the *sasi* ceremony incorporate elements of Christianity. Villagers no longer perform the initiation ceremony with the stone and shell, but they still prepare a bamboo “X” to show that *sasi* is in effect and ceremonies are held in the Church. Current *sasi* ceremonies begin by a villager bringing a small wooden board with a warning written (e.g., saying “*Awas: ada larangan gereja*”; “Watch out: church prohibition exists”) into the church. A small amount of money is provided as an offering, and a church member announces the marine resources that will be subject to harvest restrictions. The wooden board is taken to the shoreline after the ceremony has been completed, and marine harvest restrictions come into force. The board is brought back to the church when *sasi* ends, and prayers are offered to the Christian god (as opposed to the ancestors, as occurred in the pre-Christian period). A second offering of money is then made to the church instead of the traditional preparation of betel nut, rice, and flowers. All announcements regarding the beginning or completion of *sasi* take place in the church with the entire village present. Although certain *sasi adat* practices are not performed any longer (e.g., ceremonies that honor ancestors), *adat* leaders continue to work with church leaders to support *sasi*. An *adat* leader may ask church leaders to institute *sasi* or church leaders may decide to initiate *sasi* independently.

After the introduction of Christianity, *sasi adat* fused with Christian practices to create *sasi gereja*. Tomolol villagers stated that people stopped following *sasi* when traditional authority declined after the introduction of Christianity because few people feared repercussions. But as *sasi adat* evolved into *sasi gereja*, people once again became more compliant with *sasi* restrictions because they feared God. A traditional leader in Tomolol stated, “God is our priority, and if we do wrong or break *sasi*, the harvest may not go well or we may get nothing” (Tomolol villager pers. comm.). The traditional leader also described how *sasi adat* evolved into *sasi gereja* and explained that *sasi adat* existed “before people knew religion” (Tomolol villager pers. comm.). Another villager in Tomolol explained that “actually both *sasi adat* and *sasi gereja* are still practiced, and there are no big differences between them. *Sasi adat* happened when people did not know religion, so there were no religious prayers in the ceremony. Once people got to know religion, *sasi adat* became *sasi gereja*, because the elements of religion were combined into it.”

Evolution of Sasi in Fafanlap

Sasi in Fafanlap has declined dramatically with few villagers following harvest restrictions. As in Tomolol, villagers in Fafanlap suggested that *sasi* was instituted to protect resources for the next generation, and clan affiliations determined customary rights. Several villagers in Fafanlap mentioned that closing the sea for six months would allow populations of marine species such as trochus, green snail, and sea cucumber to recover from over-harvest. Significantly fewer villagers reported that *most* villagers know and follow *sasi* as compared with Tomolol; less than a quarter of those surveyed in Fafanlap reported that *most*

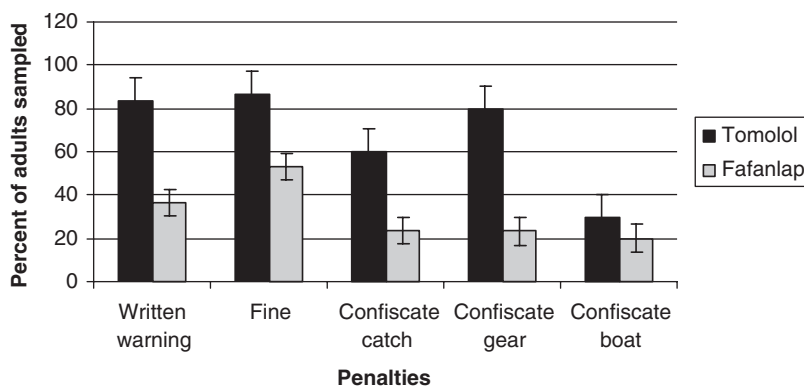


Figure 3. Penalties reported for breaking *sasi* in Tomolol and Fafanlap.

villagers know *sasi*, and fewer than 5% stated that *most* villagers follow *sasi* restrictions (see Table 2). Village elders reported that *sasi* was in force for six months during the windy season in the past, and species harvest restrictions were applied to sea cucumber, trochus (*Trochus niloticus*), oyster, and green snail (*Turbo marmoratus*). Fish were not included in *sasi* restrictions. Gear restrictions were unnecessary before bombs and cyanide were introduced, but a combination of *sasi* restrictions and government regulations are now in place to limit destructive fishing practices. No restrictions on yield exist in Fafanlap, and villagers reported fewer restrictions on harvest timing, target species, or gear. Fafanlap villagers also reported fewer penalties for breaking *sasi* than exist in Tomolol (Figure 3). Traditional penalties for breaking *sasi* included manual labor (e.g., collecting stones for building projects in the village) and standing in the sun for several hours; these penalties were viewed as forms of public humiliation.

Remaining *sasi* practices in Fafanlap are organized by *adat* leaders, who are members of the original six clans, but little enforcement of these restrictions takes place. Fafanlap villagers expressed hesitation to report *sasi* violations to their leaders, and one individual said, “I do not have courage to speak to the village leader because he is involved in corruption” (Fafanlap villager, pers. comm.). The village leader also possessed a collection of dried sea cucumber and shark fins that were currently harvested, even though *sasi* was in effect.

In contrast to practices in Tomolol, the majority of villagers interviewed in the Islamic village of Fafanlap said that they did not participate in ceremonies marking the beginning or end of *sasi*. A single villager (who was both an *adat* leader and the Imam) mentioned that while *sasi* initiation ceremonies are rarely performed, *adat* ceremonies that mark the end of *sasi* are occasionally conducted by certain village elders. The *sasi* completion rituals are also somewhat different in character from those in Tomolol. Fafanlap elders gather together for this ceremony and prepare betel nut, lime, and rice cakes cooked in coconut leaves. Tobacco and pieces of colored fabric are hung on a small tree (called *samsom* in the *Matlol* language), and villagers pray to their ancestors for an abundant harvest. Following the prayer, the *samsom* is planted by the shore and villagers enter the ocean to collect marine resources such as shellfish.

Islam does not play any meaningful role in the remaining *sasi* ceremonies that take place in Fafanlap. Islamic prayers have not been incorporated into *sasi* ceremonies. The village *Imam* (religious leader) said that any remaining *sasi* ceremonies are “purely custom

and tradition” (Fafanlap villager, pers. comm.). Islam occupies a central role in Fafanlap village life, but there are few, if any, links with traditional activities.

The erosion of traditional and religious authority has likely contributed to the erosion of *sasi* in Fafanlap. The Imam is also an *adat* leader and said that “there is no clear institution of *sasi* now; no one feels responsible for maintaining *sasi*.” The Imam and other *adat* leaders in Fafanlap did not have influence in the village, thus could not enforce *sasi*. Villagers suggested that the *kepala kampung*, who was identified as the primary enforcer of *sasi*, not only was not enforcing it, but was actually violating it. One villager also indicated that the *kepala kampung* was not one of the original clans, thus not an *adat* leader. This is important because *sasi* is rooted in the clan system and *adat* defines the structure of *sasi* (Harkes & Novaczek, 2000), thus if the enforcer of *sasi* has no connection to clans and *adat* authority, he may lack legitimacy among the local villagers. While the *kepala kampung* may not have legitimacy as a *adat* leader, his support from the local government gave him political power.

Discussion

Evolution of Sasi in a Changing World

Sasi in Raja Ampat may have been established for a number of reasons, but this research suggests that it was developed for resource sustainability and perhaps also for the equitable distribution of resources. A substantial body of literature identifies other possible reasons for the development of customary marine tenure systems in the Asia-Pacific region including conflict management (Acheson, 1981; Berkes, 1992), political control (Polunin, 1984; Chapman, 1987), and the enforcement of cultural values (Wenzel et al., 2000), thus additional research would be needed to determine the primary purpose of *sasi*. However, the underlying principles and the framework that *sasi* provides are locally recognized to be a valuable tool for the control of exploitation of resources; more than 90% of respondents in both Tomolol and Fafanlap stated that *sasi* supported by government regulations is sufficient to protect their marine resources. Despite the recognition of the importance of *sasi* to protect resources, a number of factors affect its ability to support future conservation strategies.

Common property researchers have identified factors that may contribute to the differences in the extent of the decline of customary marine tenure systems (Ostrom, 1990; Zerner, 1994a; Acheson, 2003; Armitage, 2003; Harkes & Novaczek, 2003). The factors that are likely influencing the evolution of *sasi* in Tomolol and Fafanlap include demographic factors (homogeneity, group size, migration), social factors (influence of ceremony and religion), economic factors (proximity to markets, economic opportunities), and political factors (legitimacy of local authorities, support from government and nongovernment organizations, enforcement capacity).

Influence of Demographic Factors on Sasi

Population homogeneity and group size can influence communal property regimes, and these factors have been demonstrated to affect the maintenance of customary marine tenure systems in Indonesia and Papua New Guinea (e.g., population homogeneity and group size affected *sasi* in Maluku, Indonesia, Harkes & Novaczek [2003]; and population size, distance from markets, and levels of modernization have been identified as important factors that may support or weaken customary marine management systems, Cinner et al. [2007]).

Table 3
Impacts of migration on *sasi* (number and percent of adult respondents)

	Tomolol (% sampled)	Fafanlap (% sampled)
Will affect <i>sasi</i>	22 (73%)	14 (52%)
Will not affect <i>sasi</i>	8 (27%)	13 (48%)

Chi Square: $\chi^2 = 2.818$, $df = 1$, $p = .0932$, not significant.

Our research suggests that population homogeneity and group size may play a role in Raja Ampat, supporting the findings of Harkes and Novaczek (2003) and Cinner et al. (2007). Homogeneity is a likely factor in the sustainability of the *sasi* system in Tomolol because this village is more ethnically homogenous than Fafanlap. More than 80% of Tomolol villagers identified themselves as indigenous *Matbat* while only 50% of Fafanlap villagers identified themselves as indigenous *Matlol*. Inter-marriage with outsiders can also affect group identity and undermine traditional authority as clan authority becomes less recognized by outsiders. Population in Fafanlap has increased much more rapidly than in Tomolol through both internal growth and in-migration, and a large proportion of survey respondents in Tomolol indicated that increased migration can adversely affect *sasi* (>70% in Tomolol responded positively to this question as compared with about 50% in Fafanlap, although these differences are not statistically significant; Table 3).

Influence of Social Factors on Sasi

Ceremonies are important mechanisms that may support the perpetuation of traditions, values, and practices (Turner et al., 2000; Armitage, 2003; Turner & Berkes, 2006) such as *sasi*. Through ceremonies, children can be taught by their parents and elders traditional practices, and these practices can be reinforced through community gatherings (George, 2003; Turner & Berkes, 2006). Ceremonies and rituals may help villagers remember rules and appropriately interpret ecosystem changes (Berkes et al., 2000). Ritual obligations, management obligations, and rights to community resources are all interlinked (Berkes et al., 2000), because rituals can regulate human behavior, transmission and implementation of knowledge, and management actions.

Ceremonies that reinforce *sasi* occur in Tomolol and reinforce the role of the Church in maintaining *sasi*. *Sasi* ceremonies indicate when it is in effect, what species are subject to harvest restrictions, and include the entire village. These ceremonies allow villagers to actively participate in the perpetuation of customary management. By contrast, most villagers in Fafanlap do not participate in *sasi* ceremonies. The lack of ceremonies may contribute to the decline of customary marine tenure in Fafanlap.

Religious institutions can support community cohesion and can be important in reinforcing values and behavior (Berkes et al., 2000), thus potentially are a valuable mechanism to support marine tenure systems. The introduction of Christianity in Tomolol has reinforced the existence of *sasi*. Compliance with restrictions is reinforced by the belief that God will adversely affect harvests if *sasi* is not followed. The abundance of marine resources is now seen both as providence from God and a reflection of adherence to Christian values and practices. Other researchers in the Moluccas have detected this pattern and have suggested that Christian values may now be more effective than traditional norms in providing the

people with conflict resolution skills and a more robust *sasi* system (Pannell, 1997; Purwaka & Sunoto, 1997). Additionally, religious leaders (and *adat* leaders) are instrumental in enforcing and maintaining *sasi*.

Religious leaders in Fafanlap do not enforce *sasi*, and Islam does not play a role in supporting *sasi* ceremonies. The *Imam* mentioned that there is no one to reinforce *sasi* because religious authority and traditional authority have declined, and the *kepala kampung* was not playing a role in maintaining it. These findings are not supported by other studies; Harkes and Novaczek (2000) found no connection between Islam and erosion of *sasi*. “*Sasi* has been stable in the Muslim villages where the institution is governed neither by *adat* authorities nor religious leaders. In a number of cases, *sasi* on marine resources was abandoned or weakened when *sasi* was taken over by the church” (Harkes & Novaczek, 2000, 8). This suggests that more research is needed before determining whether religion is a key factor influencing the erosion of *sasi*.

Influence of Economic Factors on Sasi

The introduction of a pearl farm operated by the PT Yellu Mutiara company has altered the economic landscape for villagers in Tomolol. The pearl farm provides jobs for villagers and is viewed by some residents of Tomolol as supporting *sasi* because its monitoring and security activities have reduced destructive fishing practices. Typically, destructive fishing practices are controlled by the national government because state laws restrict the use of such technologies. However, enforcement is virtually non-existent due to lack of capacity (e.g., police and patrol boats). Village leaders are charged with enforcement of *sasi* but also lack staff, patrol boats, and petrol needed for monitoring. Therefore, the pearl farm’s ability to regulate the use of destructive fishing technologies is the most effective monitoring and enforcement available.

Other villagers view the pearl farm as eroding *sasi* because it results in an increased dependency on the cash economy. The pearl farm provides free transport between Tomolol and Sorong, which has increased the availability of outside goods, and a significant percentage of Tomolol villagers (76%) interviewed as part of this research believed that access to cash and commercial goods has adversely impacted customary marine tenure. Fewer villagers in Fafanlap (only 46%) believed that access to cash and commercial goods adversely affect customary marine tenure (see Table 4).

The erosion of *sasi* as a result of access to the cash economy was also demonstrated in Maluku; *sasi* was most eroded on an island closest to the largest regional urban center where a consumer culture was rapidly developing (Novaczek et al., 1998; Harkes & Novaczek, 2002). Studies in Indonesia and Papua New Guinea also found that “effective conservation”

Table 4
Impacts of access to cash and commercial goods on *sasi* (number and percent of adult respondents)

	Tomolol (% sampled)	Fafanlap (% sampled)
Will affect <i>sasi</i>	22 (76%)	12 (46%)
Will not affect <i>sasi</i>	7 (24%)	14 (54%)

Chi Square: $\chi^2 = 5.126$, $df = 1$, $p = 0.0235$.

was negatively related to access to the cash economy (McClanahan et al., 2006), and customary management was only present in communities that were located far from markets (Cinner et al., 2007). Tomolol is still relatively isolated and independent of outside markets for goods other than rice. With a tradition of farming and focus on land-based resources, marine resource harvests in Tomolol are subsistence-based and apply less destructive traditional techniques. There are also fewer incentives for commercial fisheries as a result of limited market access and employment opportunities at the pearl farm. Tomolol villagers are aware of the potential impacts that modern technology and access to markets can have on marine resources, and greater contact with Sorong may decrease the influence of *sasi* and may increase pressure to participate in destructive fishing practices in the future.

In contrast to the generally positive role modern economic opportunities such as pearl farming play in Tolomol, several villagers suggested that the proximity of Sorong to Fafanlap has encouraged the use of destructive fishing technologies to exploit marine resources for external markets such as the live reef food fish trade. A traditional leader in Fafanlap estimated that outsiders were responsible for only 25% of *sasi* infringements in the area, while local residents were responsible for the other 75% of these violations (Fafanlap villager, pers. comm.). Fafanlap villagers may also use destructive harvesting techniques more frequently, because they lack other income-generating opportunities such as the pearl farm in Tomolol.

Job and educational opportunities in Sorong on the west tip of Papua are luring young villagers from Fafanlap and changing attitudes toward traditional practices. One villager said, "A long time ago people followed *adat*, but today the young people work or study outside the village and then come back with new ideas and do not want to follow the old rules" (Fafanlap villager, pers. comm.). New ideas included a greater desire for goods and material wealth and a lack of respect for traditions. Some researchers suggest that the movement of young people from a village can change the way knowledge is transmitted (Wright, 1985). For example, if local knowledge is transmitted typically from father to son or uncle to nephew, and it is the young people that stay in the village who receive the training, the knowledge may not be transferred to blood relations of the elders who hold the knowledge (Wright, 1985).

Influence of Political Factors on Sasi

Sasi must be reinforced by local authorities to legitimize the institution, and authorities that support *sasi* must also possess power and legitimacy in the community. Previous research (Ostrom, 1990; Harkes & Novaczek, 2003) suggests that trust, reciprocity, and legitimacy are critical components of successful common property institutions. Legitimacy is tied to clan affiliation, and village leaders must be long-term residents to maintain their positions as sources of traditional authority (Harkes & Novaczek, 2003). The village leader in Tomolol was a member of an original clan and possessed greater legitimacy than the village leader in Fafanlap who did not have *adat* status. Trust in the village leaders' ability to enforce *sasi* is also a key element of their legitimacy. Village leaders must demonstrate both the authority and capacity to protect marine resources, and this combination of factors still exists in Tomolol but not in Fafanlap. Nearly 75% of the Tomolol sample identified the village leader as a leadership figure who is able to solve environmental problems, while fewer than half those interviewed in Fafanlap agreed with this statement (Table 5). The legitimacy of traditional and village leadership in Fafanlap has declined, and religious authorities have not stepped in to fill this leadership void as they have in Tomolol. This lack of leadership has undermined *sasi*, as no source of local authority exists to support

Table 5
Perceived solvers of coastal and marine environmental problems

	Tomolol		Fafanlap	
	Freq	%	Freq	%
Villager	1	3.3	2	6.7
Tourist/Visitor	0	0.0	0	0.0
Head of district (Bupati)	5	16.7	4	13.3
Village leader (Kepala kampung)	22	73.3	12	40.0
National government	0	0.0	0	0.0
Private business	0	0.0	0	0.0
Fishermen	0	0.0	0	0.0
NGO	2	6.7	3	10.0
Other	0	0.0	3*	10.0
Don't know	0	0.0	6	20.0
Total respondents	30	100.0	30	100.0

* Army, police, *adat* leader.

the practice. The perpetuation of *sasi* ceremonies that are actively led by local religious authorities in Tomolol also serves to reinforce their leadership standing in the community.

Traditional marine management practices must be enforced, protected, and legally recognized by higher levels of government to function effectively (Ostrom, 1990). An overlap of authority between traditional and formal government proved essential for the perpetuation of *sasi* in Maluku (Harkes & Novaczek, 2003). Nearly all villagers interviewed as part of this research stated that *sasi* must be supported by government regulations to be effective in Raja Ampat. This is particularly true in the case of controlling new and destructive fishing methods such as explosives, since these practices did not exist when traditional laws were originally developed. Government regulations also provide a mechanism for preventing outsiders from exploiting marine resources, because allowing outsiders to violate *sasi* can encourage locals to do so as well. Crawford et al. (2004) also observed that the legitimacy of village-based rules was increased when government regulations supported community enforcement.

Opportunities exist at the local level to coordinate formal government laws with traditional marine management practices such as *sasi*, because the management of social, economic, and environmental concerns has largely shifted to the regional level within Indonesia since 1999. *Kabupaten* (regency) governments have been granted the right to manage marine resources up to four miles from shore. Law No. 22/1999 granted villages "natural autonomy," and supported the Village Representative Board (BPD) whose role is to "protect local customs and traditions, make village regulations, gather and channel community aspirations, and supervise organization of village governance" (Article 104). The law also states that *Kabupaten* regulations must acknowledge and respect Village rights, customs, and traditions (Article 110 and 111). The devolution of authority could encourage a revival of community-based common property resource management regimes under the appropriate conditions (Thorburn, 2002). Indonesian Law 32/2004 also has provisions that support traditional rights including the right of communities to be involved in the development of regional regulations. However, this only reinforces the need for traditional

practices to comply with the existing legal framework. The 32/2004 Law also clarified the earlier Law No. 22/1999 to state that traditional fishing rights were not affected by newly established regional maritime areas. However, some districts have prevented traditional fishermen from entering district waters, thus the law is not always followed at the district level (Patlis, 2005). This national law also includes provisions that ban destructive practices and pollution in fishery management areas, but enforcement of these provisions has proven to be difficult (Harkes & Novaczek, 2003). Indonesia's new law on the management of coastal areas and small islands (UU27/2007) also provides the legal basis for Indonesian groups and individuals to apply for use rights to coastal waters (up to 12 nautical miles from the coastline) for a period up to 20 years (Article 16 on Coastal Water Use Rights; *Hak Pengusahaan Perairan Pesisir*). Use rights will not be granted in protected areas that have already been established.

Nongovernmental organizations (NGOs) also can play an important role in supporting *sasi*. During the 1980s and 1990s, international and national NGOs promoted *sasi* in Indonesia as an environmental institution and body of customary law that supports conservation, sustainable development, and social equity (Zerner, 1994a). Some researchers have suggested that perceptions of nature among *sasi* practitioners may not be compatible with Western understandings of limits (Zerner, 1994b). For example, if locals perceive that harvest is tied to proper performance of *sasi* rituals, they may not share the view that marine resource condition is a result of overharvest. However, in both Tomolol and Fafanlap, villagers identified the exploitation of marine resources as a major problem, and suggested that *sasi* provided a mechanism to regulate this exploitation. It is critical that conservation organizations communicate with locals regarding the causes of marine resource decline and the strategies to address the decline, so that false hopes are not generated about the ability of *sasi* to achieve ambitious conservation goals.

Villagers in Tomolol recognized the potential for NGOs to support *sasi* by addressing local conservation challenges such as the lack of enforcement for *sasi* violations. These villagers suggested that NGOs could provide boats for enforcement and education programs for villagers to support the regulations protecting marine resources. Villagers also suggested NGOs could establish an office in their village to help prevent outsiders from exploiting their marine resources. Another villager mentioned that NGOs could report *sasi* violations to local government officials because the government is not aware of problems occurring at the village level. In addition to enforcement, NGOs can also work together with local governments to reinforce the role of local authority figures who are necessary to support and legitimize *sasi*. For example, NGOs may encourage the pearl companies to develop contracts with the clans that hold legitimate marine tenure rights to reinforce the clan structure and authority. The PT Yellu Mutiara company (pearl company) was criticized by some villagers in Tomolol because the company negotiated a lease with a clan that did not have customary rights over the area. Finally, NGOs can support the participation of the younger generation in conservation meetings and activities to encourage them not to use destructive fishing techniques that provide large economic benefits in the short term but destroy future livelihood opportunities. By building on the foundations of *sasi*, modern conservation strategies reinforce local values and traditions, are more likely to have local support and buy-in, and are more likely to be sustainable, ensuring that marine resources will continue to provide for the communities that depend upon them for survival.

Currently, NGOs are playing a major role in protecting the valuable marine ecosystem and the livelihoods that depend on these resources in Raja Ampat. Major international organizations such as The Nature Conservancy and Conservation International are working in close partnership with the government and local communities to conserve marine resources

through the development of marine protected areas (MPAs) and no-take zones (McKenna et al., 2002; Donnelly et al., 2003; Halim & Suebu, 2004). In 2006, the Raja Ampat Regency Government established six new MPAs, making it the first Indonesian district to declare an MPA network. The Nature Conservancy and Conservation International are working to support the government in the establishment and management of the MPA network. Plans are underway for the establishment of additional MPAs in the region; a network of district-managed MPAs has been identified, and the network is being formalized through a local coastal management law (PERDA) (Mous, 2008).

Conclusion

Sasi continues to be an effective component of marine resource conservation efforts in eastern Indonesia despite the decline of the tradition in many areas (Bailey & Zerner, 1992; Mantjoro, 1996; Harkes & Novacek, 2002). Our research in Raja Ampat largely confirms these earlier findings but adds a heightened recognition of the role that modern institutions such as the Christian church, commercial enterprises, and government and nongovernmental organizations can play in supporting *sasi*. Additionally, homogeneity, group size, migration, ceremonies, proximity to markets, and economic opportunities may also affect the perpetuation of traditional management systems.

The survival and continued relevance of *sasi* requires support from local community leadership figures, modern commercial enterprises, and government and nongovernmental institutions. When traditional practices such as *sasi* are reinforced by modern institutions and statutory law, this combination can be particularly helpful in building resilience into local communities dependent on marine resources during times of social, cultural, and economic change. *Sasi* has been “continuously reinterpreted by a variety of actors following the trajectory of changing institutional interests and images” (Zerner, 1994a, 1). If adequately reinforced by governance systems, *sasi* can absorb changes in power structures, economic opportunities, and community values and can be reinvented once again. By helping to build *sasi* into conservation strategies, nongovernmental organizations and governments ensure that these strategies reflect local values, local power structures, and the dynamism that defines communities everywhere.

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