HOKKAIDO UNIVERSITY

ゾーニングに基づく従来型保全モデルの再検討
"Examining the validity of conventional zone-based conservation model:
An insight from local forest use and management in a mountain community on Seram island, east Indonesia

「熱帯森林利用のローカル・ガバナンスの可能性に関する地域間比較研究」第二回研究会
京都大学地域研究統合情報センター 2013年7月27日

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Background of my dissertation
自然保護におけるシンプリフィケーション(Simplification in conservation)

- **1980** 年代からの「参加型保全」→ 多くが失敗
- その一要因:「自然保護におけるシンプリフィケーション」
- 自然保護におけるシンプリフィケーションとは?
  - 自然保護に関わる外部の利害関係者(「外部者」)と地域住民との非対称的な力関係を背景に、地域固有の「人と自然とのかかわりあい」が、「外部者」の一方的なまなざしにより切り取られ、その複雑性や多面性が捨象
  - 生物多様性保全などの普遍的な価値の実現のために、「外部者」がローカルな文脈に埋め込まれた複雑で多面的な<人ー自然>関係に介入し、より制御しやすい形に一元化・規格化し、再編成していく作用
- 自然保護のシンプリフィケーション →住民に何らかの「受苦」を強いるもの
- 地域の人びとが可能な限り主体性を発揮できる自然保護**(conservation based on the local people's direction)**が必要

Simplification in conservation

Unequal power relationships between "conservation outsiders" and local people

↓

One-sided, oversimplified view on local people-nature relationship by "outsider"

- ***Insufficient understanding of meanings and importance of wildlife resource use for local people***
- ***Overlooking local people's roles contributing to conservation of wildlife resources***

↓

Conservation Project/ Policy based on oversimplified view on local people-nature relationship

↓

Outcomes

- **Discrepancy between Conservation Project/ Policy and local actual conditions**
- **Socially unjust conservation which force local people bear cost for conservation**

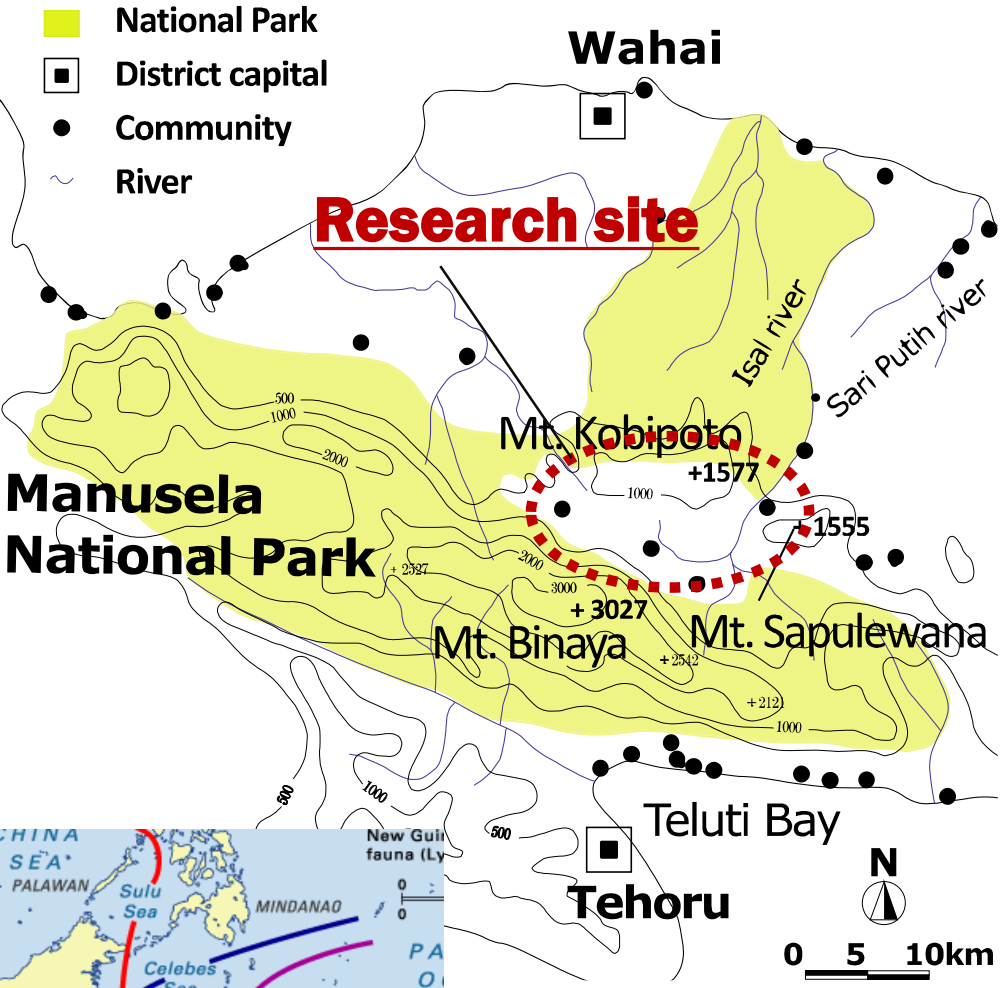
Purposes of my Ph.D. study

- **研究対象地**：国により保護された野生動物の利用が，地域の暮らしを支えるうえで重要な役割を果たしているインドネシア東部セラム島の一山村
- **手法**：コミュニティスタディのアプローチ（マクロな政治経済環境との相互作用を意識しつつ）
- **課題**：
  1. ローカルな文脈に埋めこまれた「人と野生動物のかかわりあい」を詳細か包括的に描く。その際、次の二点に着目
     - 人びとにとっての野生動物利用の意味
     - 在来知に基づく営為が<野生動物―人>関係の持続可能性与える影響
  2. 人びとが主体性を発揮できる「自然保護」を推進してゆく上で、「外部者」に必要とされる視点について考察

Through an ethnographic research in mountain community which is highly dependent on protected wildlife in Seram Island, eastern Indonesia, my Ph. D. study aims :

- **To clarify interrelationship between protected animals and human which are embedded on the local context by focusing on**
  - **Economic, social cultural meanings of wildlife resource use for local people**
  - **local practices based on local knowledge contributing to sustainable wildlife resource use**
- **To provide policy and research implications on socially just conservation based on the local people's direction**

Research site

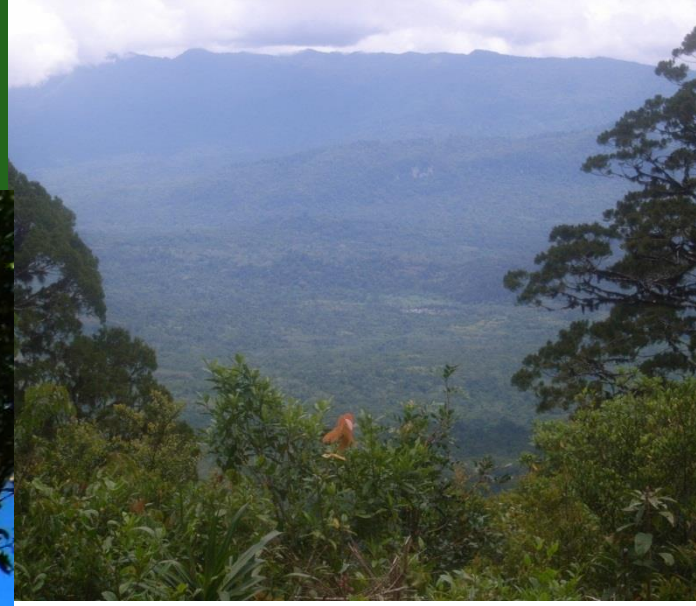


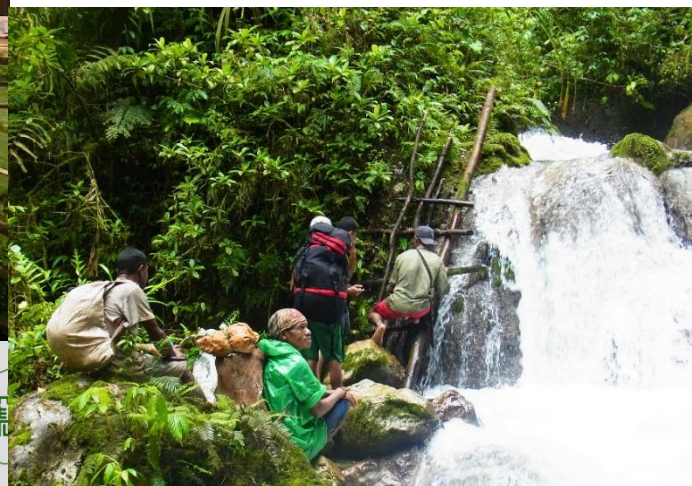
Amani oho (fictitious name)

- **Population**：±320 (±60 households) in 2012
- **Subsistence activities: sago-starch extraction, hunting/trapping, NTFP collection**
- **Main sources of income: seasonal migrant work as harvester of clove, selling bush meat, parrot trade, etc.**
- **Access to North**：**2-3days on foot, to South: 1day on foot**
- **Located in the interior of central Seram nearby National Park**

Research

- **Period: 2003-2010 (total length of field work : 1 year 3 months)**
- **Data collection methods: Key informant, one-on-one, group interviews, participatory mapping, self-administered sheet surveys, participatory observation etc.**





Outline of my dissertation

Title of my dissertation: An Ethnography of wildlife resource use and management in Seram, Wallacea: Toward conservation based on the local people's direction

第1章 研究対象地の概観

野生動物利用の意味の検討

第2章　狩猟獣のサブシステンス利用
狩猟獣の肉の分配の社会文化的意味

第3章　オウムの商業利用
僻地山村における「救荒収入源」としての役割

保全に寄与する人びとの営為についての記述・分析

第4章　在来農業
農が結ぶ野生動物と人との双方向的な関わり

第5章　在地の狩猟資源管理
超自然的強制メカニズムが支える森の利用秩序

終章　総括と討論
- セラム島の自然保護に対する提言
- 「住民主体型保全」に求められる視点・アプローチ

2012年コモンズより刊行．全**370**頁．（価格：**4,200**円＋税，**ISBN 978-4-86187-073-6**）

Local people, national park, subsistence activities (1)

- インドネシアの国立公園管理は基本的に、公園内の「自然の完全性」を保つため、人の資源・土地利用を可能な限り止めさせようとする排除・隔離型管理
- 一方、住民の利用を認める仕組みも存在
  - 協働型ゾーニング：公園管理局、地方政府、**NGO**、住民などからなる作業チームを結成、自然・社会環境に関する様々なデータを集め、それをもとに区画設定
  - 住民の土地・資源利用を可能にする区画設定も法規上可能
  - 問題：**'traditional zone'** や**'special zone'**の面積が小さい、様々な制限がある(それら区画内でも保護動物の狩猟や樹木の伐採は認められていない)、そもそもゾーニングが行われていない**etc.**

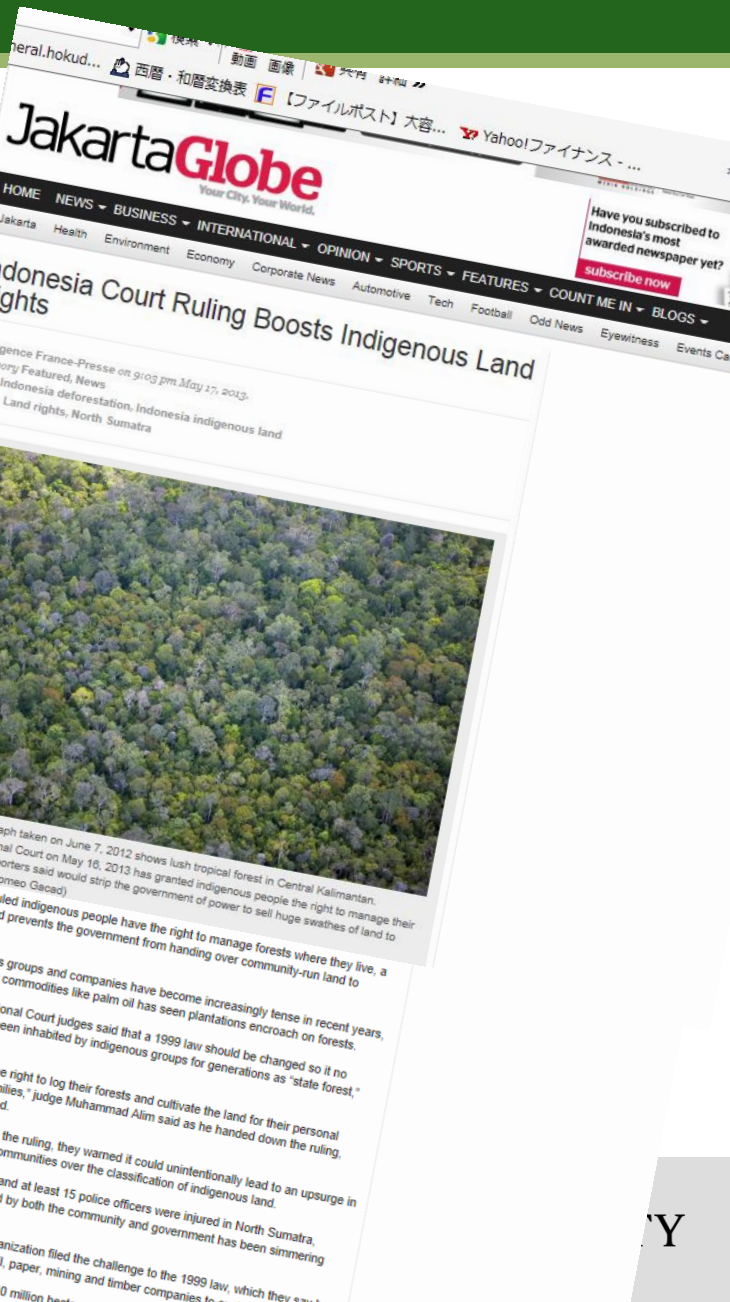
Zoning system of Indonesian national parks

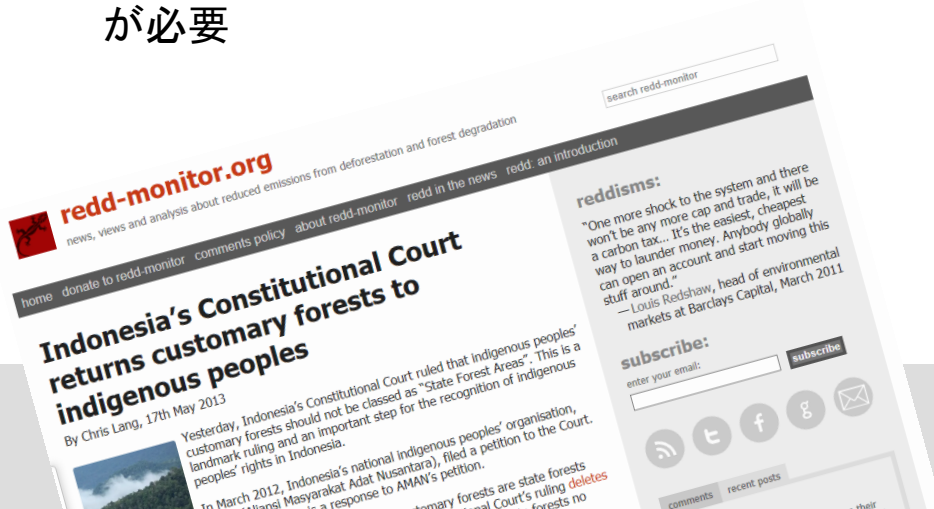
Zone	Allowed activates	Local resource use	Not adjoining core zone
Core	Research, education, building non-permanent supporting facilities		
Wilderness	Research, education, restricted tourism, building supporting facilities		
Utilization	Tourism and tourism development, building supporting facilities		v
Other zones			
- Rehabilitation	Rehabilitation related activities		
- Religious, cultural and historical	Rituals, cultural/historical sites maintenance		
- Traditional	Resource use (NTFPs) in a traditional way	v	
- Special	Accommodating facilities and infrastructure (e.g. roads and electricity), resource/ land use for livelihood	v	v

Sources: Ministerial Decree 'P.19/Menhut-II/2004 on collaborative management of nature reserves and protected areas, and Ministerial Decree'P.56/Menhut-II/2006 on guidelines for zoning of national parks

[c.f.] 森林居住者の森に対する権利をめぐる最近の状況

- **2013年5月16日、インドネシアの憲法裁判所が先住民の森に対する権利を保障する旨の裁定**
- 先住民コミュニティが歴史的に利用・管理してきた森は「慣習林**(hutan adat)**」と認められたとしても、法的には**(National Act No. 41 Year 1999 on Forestry)**あくまでも「国有地」
- 森に対する権利は、”公共の福祉”に反しない範囲内でのみ認められていた➔先住民とアブラヤシ企業や鉱山企業との土地をめぐる争いがあとを絶たなかった
- この憲法裁判所の裁定が、今後、実際の保護地域管理にどのように影響されるのか、注視が必要





Local people, national park, subsistence activities (2)

- アーボリカルチャー(有用樹木の(半)栽培・保護・利用)を一部国立公園内で、狩猟活動の大部分を国立公園内で「違法に」実施(後述)
- それら「違法」行為は、広い範囲にわたって非集約的・散発的におこなわれている←遠隔地に位置するため実質的な公園管理は及んでいない

  ・・・調査地の文脈で「地域住民の森林管理への自律的参画」をどのように可能にしてゆくかを考える「とりかかり」として、
- この報告では、在地の狩猟資源管理とアーボリカルチャーに焦点を当て、保全に寄与し得る「在来知」に根ざした人びとの実践について紹介し、排除・隔離型の**conventional zone-based conservation model**を再考

Outline of this presentation

1. **Topic1: Suitability of Resource Management based on Supernatural Enforcement Mechanisms to Local Socio-cultural Context**
   - The importance of forest game animals & trapping methods
   - Supernatural agencies in the forest
   - Norms to control forest use
   - Supernatural enforcement mechanisms
   - Discussion-1
2. **Topic2: Conservation value of less-intensively managed human modified forests formed through 'arboriculture'**
   - Provisioning services provided from HMFs
   - Formation of HMFs through arboriculture
   - Importance of HMFs as parrot habitats
   - Discussion-2
3. **Implications: Examining the validity of conventional zone-based conservation model**

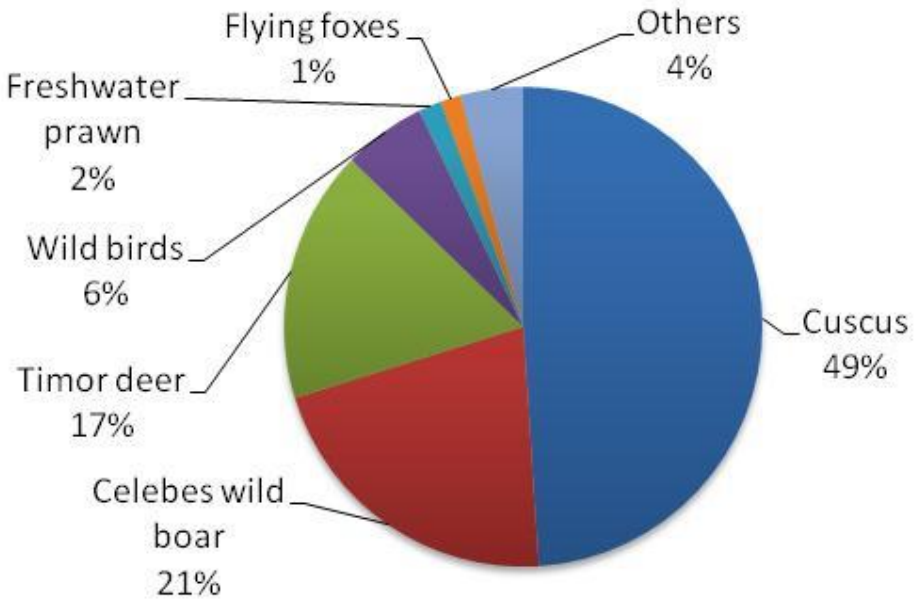
Suitability of resource management based on supernatural enforcement mechanisms to local social cultural context

The importance of forest game animals

Sus celebensis

Cervus timorensis

Phalanger orientalis



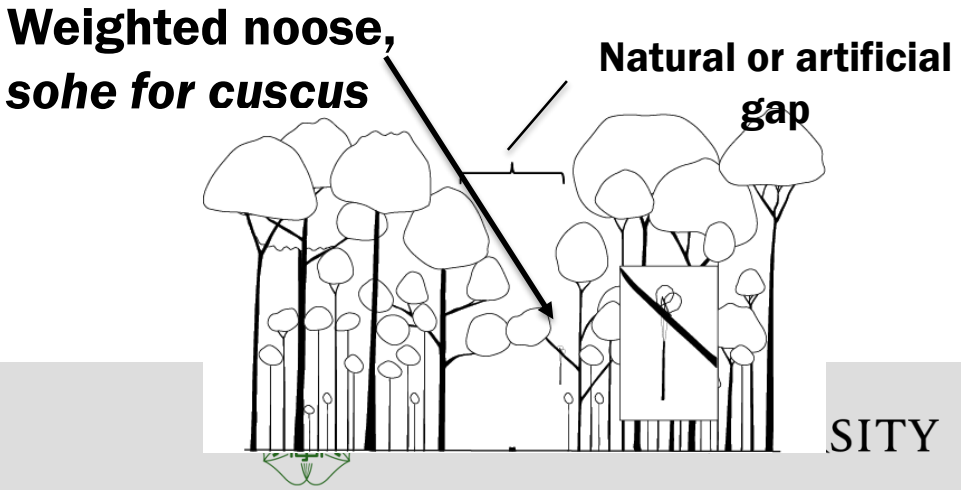
Dietary intake of main animal resources (in terms of amount of protein)

Source: Field research

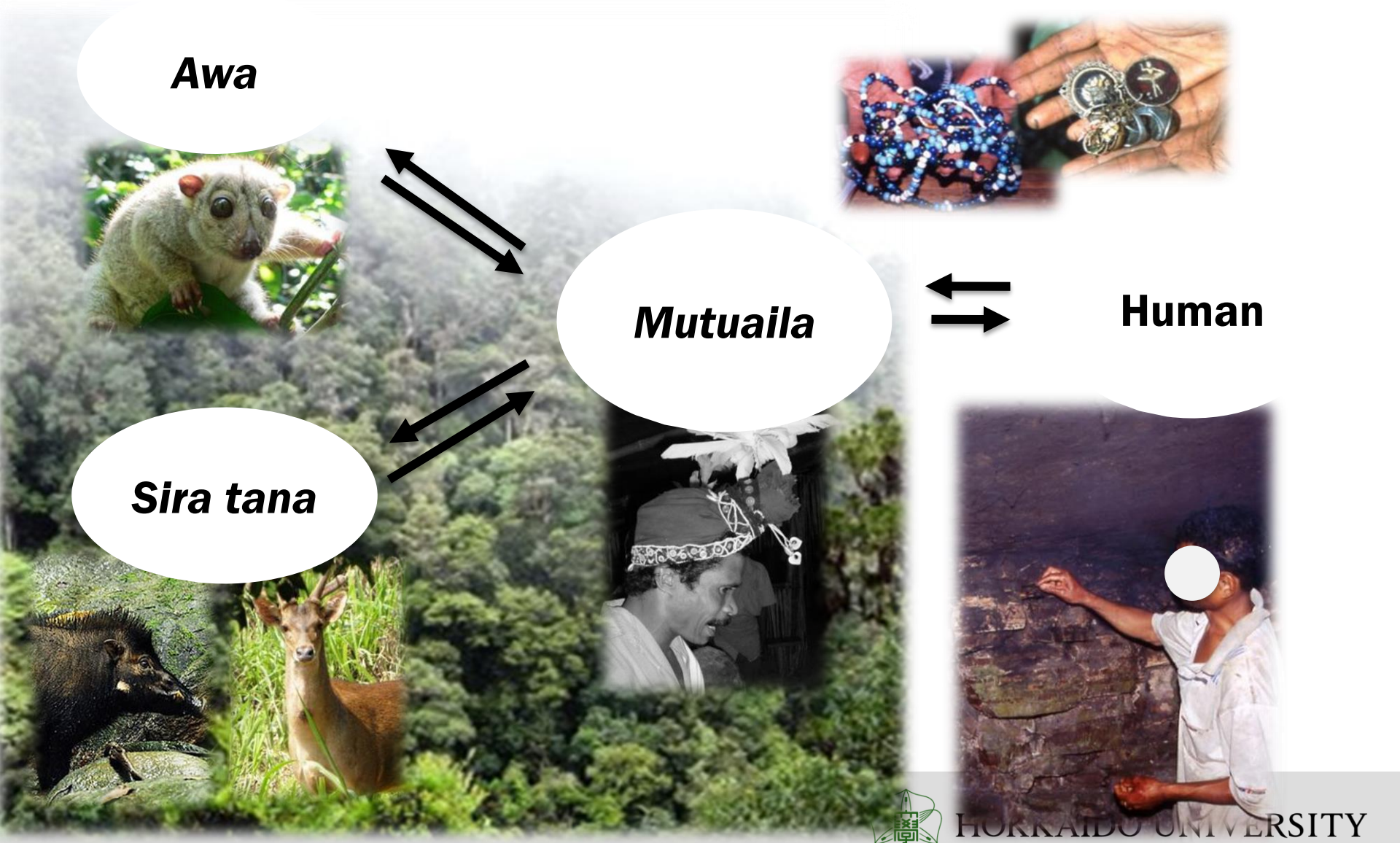
Note: The proportions was culcurated on the basis of the number of animal resources caught by 15-19 households during 4 data collection periods (duration of each period is 18-29 days. The total data collection duration was 89 days).

Trapping Methods

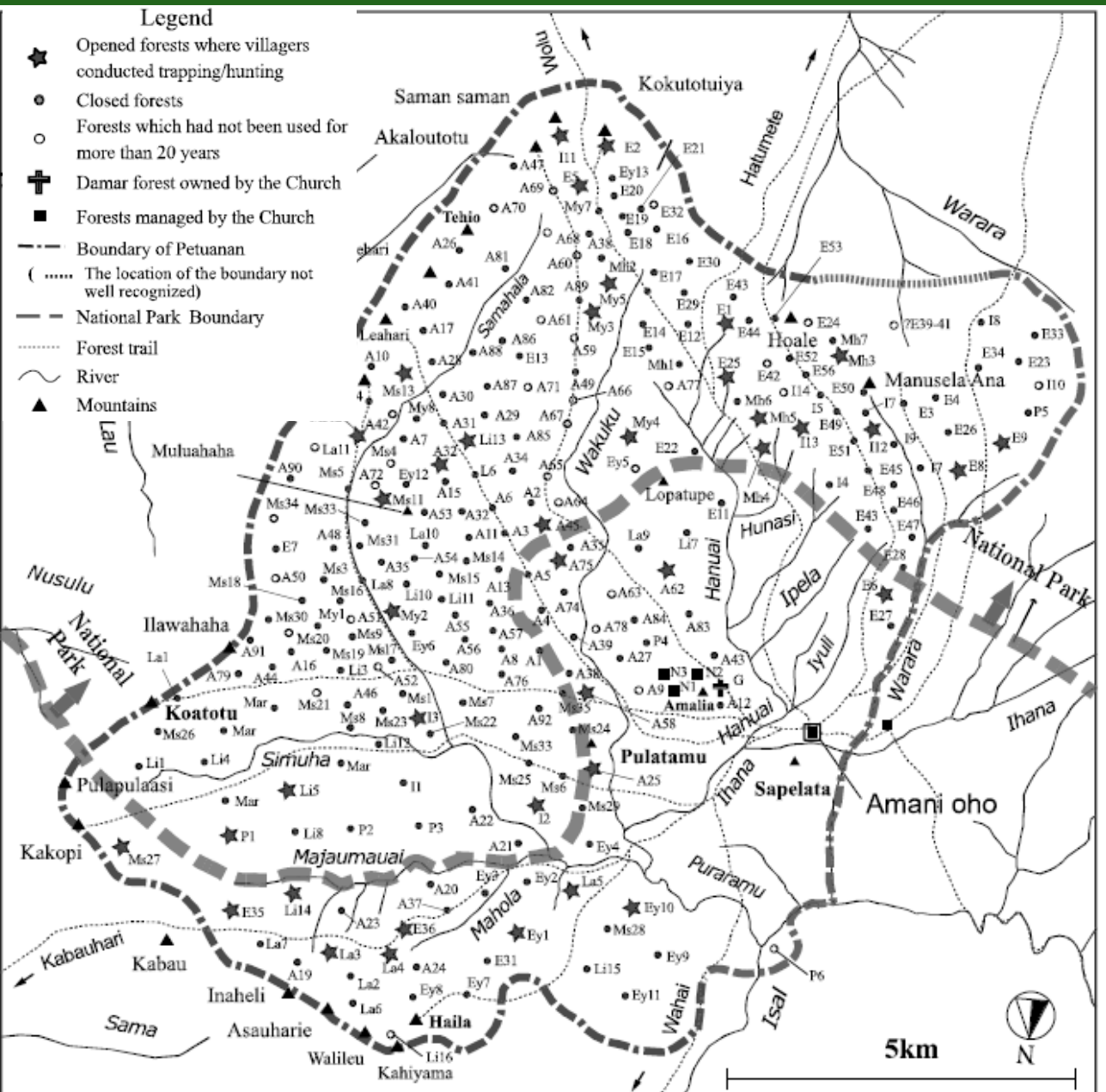
Spear trap, *hus panah for* Timor deer and Celebes wild boar



Supernatural agencies in the forests



Norms to control forest use customary forest tenure



- ***Kaitahu*: primary or old secondary forest used as hunting grounds**
- **Forest area is divided into more than 250 forest lots**
- **Each *kaitahu* belongs to a certain individual or group, *kaitahu kua***

Categories of kaitahu according to the scale of *kaitahu kua*

Type of *Kaitahu*	*Lohuno* forest (*kaitahu lohuno*)	*Soa* forest (*kaitahu soa*)	Kin-group forest (*kaitahu keluarga*)	Private forest (*kaitahu perorangan*)	Discrepant	Total
Number of the forest lots	8	48	133	63	5	257
Percentage	3%	19%	52%	25%	2%	100%

Source: Field research.

Note 1: In addition to the forest lots listed in the table, there were three village forests owned communally by all villagers and a village church forest owned by the village church. All these forests are Agathis damara-dominated forests, which have been maintained for resin extraction.

Note 2: "Discrepant" stands for the forest lots whose recognition of tenure status is discrepant.

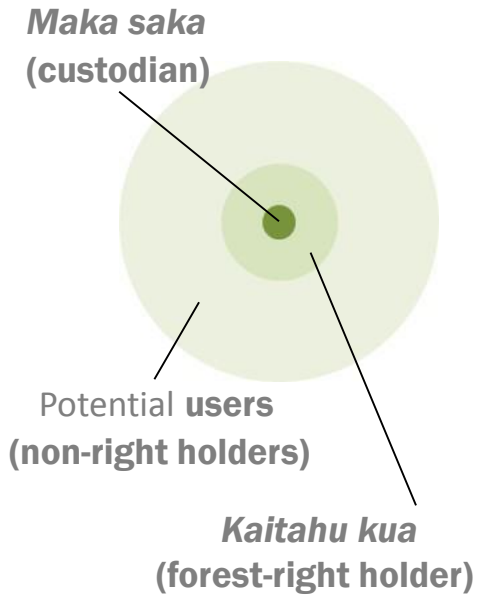
Folk categories of kaitahu according to the history of forest rights inheritance and transfer

Type of *kaitahu*	Description	Number of forest lots
Kaitahu mutuani	Forest inherited by the ancestors through patrilineal lines from generation to generation	180
Kaitahu nahunahui	Forest given gratuitously by the right-holding individual or a group that obtained some support or aid as a return for it.	22
Kaitahu katupeu	Forest given by a person who was injured or came down with an illness in a forest, or by the relatives of a person who died in the forest to person(s) who carried the injured/sick person or the dead body to the village.	4
Kaitahu helia	Forest gifted by the bride's side to the groom's side as a return gift for a majority of the bride's price.	10
Kaitahu fununui	Forest given gratuitously by the bride's father, brother, or relatives to the bride.	7
Kaitahu tohutohu	Forest purchased in old dishes (matan), textiles, and money.	21
Kaitahu rela	Forest confiscated from a man who commits adultery with a married woman, or from his farther, or relatives, as a fine.	5
Kaitahu tukar	Whose forest right was exchanged between two *kaitahu kuas*	2
Source: Field research		

Social arrangement for unexclusive forest use

- **Villagers can hunt or trap game resources in the "forest of others"(forest they do not own) if they obtain permission from the *kaitahu kua*, especially by the *maka saka* (the custodian of the forest)**
- ***Kaitahu kua* is not socially allowed to reject the request of others to use their forest**
- ***Kaitahu kua* can refuse the request only in the case that forest is still under the condition of *siniha*—a condition where the population of game animals is yet to recover**

➔ Access to *kaitahu* is open to non-owners under control of *kaitahu kua*



Forest use types	Number of households	%
Households using only their own forest	26	59
Households using only the 'forest of others'	12	27
Households using their own forest and the 'forest of others'	2	5

Source: Field research.

Temporal ban on hunting/trapping: *Seli kaitahu*

- **The emic purpose of *seli kaitahu***
  - ➔ **"to increase the number of game animals in the forest once their numbers decline"**
  - ➔ **"to prevent poaching during the closing of the forest"**
- **Rituals in *seli kaitahu*: praying to *awa*, *sira tana*, *mutuaila***
- **Local people's belief: the violator of *seli kaitahu* will surely meet with misfortune**

Temporal ban on hunting/trapping: *Seli kaitahu*

Forest lots closed by the imposition of a *seli kaitahu*		
Forest under selikaitahu or not	Number of forest lots	%
Forest under *seli kaitahu*	203	79
Forest used as a trapping/hunting site	40	16
Forest which was not used and not subject to the ban of *seli kaitahu*	3	1
Unknown	11	4
Source: Field research.		

Supernatural enforcement mechanisms:

Narratives concerning violations of *seli kaitahu (1)*

Case 1

One day, in 1986, A. Li. and his brother in law Z. A. went hunting together to Akalautotu, a forest collectively owned by the sub-clan that Z. A. belonged to. After that, they entered Aimoto, another forest of the sub-clan to hunt cuscus. However, seli kaitahu had been imposed on the forest.

A. Li found cuscus hiding in a deep tree hollow. To catch the cuscus, he cut down the tree at the root. Since arboreal vines were twined around the trunk of the tree as well as the next tree, the tree was pulled by the vines and fell down to the ground. A. Li was crushed to death under it. The village head of Amani oho, Ym. A., and a village elder F. Li. said that if they had asked maka saka to remove seli kaitahu of Aimoto, he would have never met with such an accident.

[Source: Interviews with Y. A.(63, male); F. Li. (71, male); A. Li.(50, male) in 2004]

- **The structure of narratives : misfortune experienced by the rule-breaker or their family members connected to the violation**

Supernatural enforcement mechanisms:

Narratives concerning violations of *seli kaitahu (2)*

Case 2

One day in 2006, D. A. set sohe in a forest named Pahitasia Tuetue after lifting the ban of seli kaitahu on the forest. They closed the forest for about 5 years by imposing seli kaitahu. While setting sohe, D. A. found many new totoi (incisions made in a trunk of a tree used as steps to climb the tree) in several trees with a tree hollow used by the cuscus as a shelter. This indicated that there was someone who conducted spear hunting, thus violating seli kaitahu.

Half a year before lifting the ban of seli kaitahu, a male villager had engaged in hunting in a forest adjoining the Pahitasia tuetue. D. A. assumed that the man hunted forest game animals in the Pahitasia tuetue.

D. A. did not report the infringement to latu nusa, the head of the adat law organization, responsible for the resolution of adat law infringement, because no one can identify the poacher and if we try to find out the infringer, relationships among villagers will worsen. D. A. said "even though we don't know when it will happen, the time (when supernatural agencies bring about the infringer a misfortune) will surely come, so we should only wait for it" .

About 6 months later, the wife of that man had extremely hard labor when she gave birth to a baby. D. A. thought of it as a sanction imposed by mutuaila, awa, and sira tana.

[Source: Interview with D. A.(33, male) in 2007]

- **Agents expected to play roles in monitoring forest use and punishing the violator :supernatural agencies**
- **Every time an unfortunate event occurs, such a narrative giving a version of the interpretation on its cause is developed and discussed → the reality of the supernatural forces is reinforced**

Supernatural enforcement mechanisms:
Recent transition in forest resource management

Case 3

Sewatinueni and Ahahae (forests collectively owned by a clan that Y. A. belong to)had been used and managed by Y. A. He has recognized that someone is engaging in trapping/hunting in these forests for several years. Therefore, Y. A. imposed a sasi greja on these forests in October 2005. It was the first sasi gereja against forest use in Amani oho.

The imposition of sasi greja was not because Y. A. no longer believed in the effectiveness of seli kaitahu. According to him mutuaila and natural spirits sometimes inflict akeake (punishment) on the offender long after seli kaitahu is broken, whereas, in sasi greja, the Christian God punishes the sasi breaker shortly after the infringement. Y. A. imposed sasi greja on these forests in order to have the poachers meet with some punishment as soon as possible.

In December 2006, a half year after placing the sasi greja, Y. A. requested opening the sasi in both forests to the village church council. After the announcement of the removal of the sasi in the Sunday service, his son-in-law went trapping in the forest and found several new totoi (incisions made by machete in a tree trunk to climb the tree). This indicated that someone had conducted spear hunting for cuscus, thus violating the sasi greja.

Y. A. suspected X, who was known as the master of tree climbing, of poaching in the forests, since many totoi had been made in huge trees, which ordinary people hesitated to climb. In addition, X had caught many cuscuses and had sold them in the village.

X had also suffered from terrible malaria and hovered closely between life and death in October 2006. The misfortunes of X were interpreted as punishments inflicted by the Christian God as the consequence of his violation of the sasi gereja

[Source: Interviews with Y. A. (63, male), H. Li.(28, male), and Y. Li. (36, male) in 2007]

Discussion-1 (1)

- **Practicality and effectiveness:**
  - IRM based on supernatural enforcement mechanisms apparently does not have society bear a high cost in monitoring and sanctioning → fairly practical and effective (?)
- **Suitability to local social cultural context :**
  - The local people's tendency to avoid discord within the community because of a strong fear of sorcery [Sasaoka 2008]
  - Strong hesitation to point out others' errors under face-to-face situations

    [c.f. Their attitudes to contradictory versions of the accounts of forest tenure]
    - No intention to resolve the discrepancy through direct dialog and negotiation
    - Strong feelings of shame/constraints (*mukae*) in trying to assert the legitimacy of the recognition to the opponent under a face-to-face situation
  - IRM based on supernatural enforcement mechanisms serves to prevent any discord among villagers that may arise from the enforcement process, since people do not directly accuse or punish the violator → quite suitable for the socio-cultural context

Discussion-1 (2)

- As illustrated in case 3, implies the local people's tendency to establish and maintain order in forest use depending on the forces of supernatural agencies
- As long as the forest tenure is secured and the cultural homogeneity does not degrade, they may continue their efforts in forming and maintaining the well-structured forest use in their close relationships with supernatural agencies (?)
- Further research is still needed, particularly in examining the effectiveness of IRM based on local people's views of the supernatural world, taking cultural resilience into consideration

Sasaoka, M., and Y. Laumonier. 2012. Suitability of local resource management practices based on supernatural enforcement mechanisms in the local social-cultural context. *Ecology and Society* 17(4): 6.
http://dx.doi.org/10.5751/ES-05124-170406

Research

Suitability of Local Resource Management Practices Based on Supernatural Enforcement Mechanisms in the Local Social-cultural Context

Masatoshi Sasaoka[1] *and Yves Laumonier*[2]

ABSTRACT. Environmental anthropological studies on natural resource management have widely demonstrated and thematized local resource management practices based on the interactions between local people and supernatural agencies and their role in maintaining natural resources. In Indonesia, even though the legal status of local people's right to the forest and forest resources is still weak, the recent transition toward decentralization presents a growing opportunity for local people to collaborate with outsiders such as governmental agencies and environmental nongovernmental organizations in natural resource management. In such situations, in-depth understanding of the value of local resource management practices is needed to promote self-directed and effective resource management. Here, we focus on local forest resource management and its suitability in the local social-cultural context in central Seram, east Indonesia. Local resource management appears to be embedded in the wider social-cultural context of the local communities. However, few intensive case studies in Indonesia have addressed the relationship between the Indigenous resource management practices closely related to a people's belief in supernatural agents and the social-cultural context. We illustrate how the well-structured use of forest resources is established and maintained through these interactions. We then investigate how local resource management practices relate to the social-cultural and natural resources context of an upland community in central Seram and discuss the possible future applications for achieving conservation.

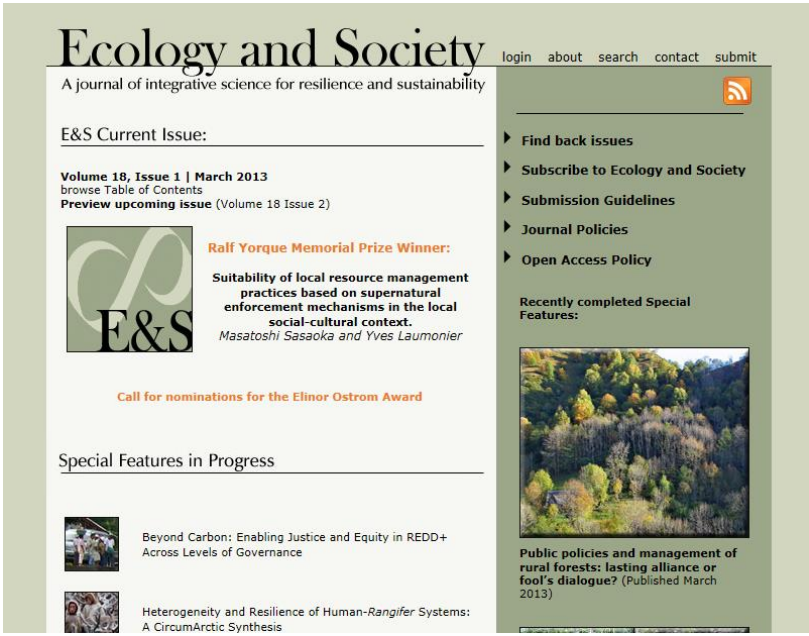
Key Words: *forest management; game resources; hunting; local resource management; local social-cultural context; Seram; supernatural enforcement mechanism*

INTRODUCTION

Environmental anthropological studies on natural resource management have thematized local resource management practices based on supernatural enforcement mechanisms, i.e., whereby people believe that supernatural agencies such as ancestor spirits and natural spirits monitor human conduct and impose punishments on violators, promoting compliance with the rules. For example, Colding and Folke (2001) conducted a wide literature review on social taboos guiding human conduct toward the natural environment, referred to as resource and habitat taboos (RHTs), and compared RHTs in many places around the world to contemporary measures of conservation. Their review reveals that some RHTs supported by supernatural enforcement mechanisms have functions similar to those of formal institutions for nature conservation. An extensive literature review conducted by Hamilton (2002) classifies cases in which trees, groves, and forests are protected because of their sacredness or evil power and discusses the importance of metaphysical constraints in the conservation of biodiversity and culture. Bhagwat and Rutte (2006) also present evidence of conservation traditions at natural sacred sites around the world. They indicate that it is necessary to incorporate natural sacred sites into existing protected area networks, focusing on current threats to sacred sites such as legal ownership denying customary rights, population growth, increasing immigration, and the influence of westernized urban cultures.

In addition, several case studies of local resource management based on the supernatural enforcement mechanism have been published such as the following examples. Byers et al. (2001) examined the role of traditional religious beliefs and leaders in conserving remnant patches of a unique type of dry forest in northern Zimbabwe. Virtanen (2002) investigated the social-cultural basis of sacred forest institutions continuously functioning at the juncture of changing state laws and customary laws on the basis of a Mozambique case study. Saj et al. (2006) assessed the extent to which traditional hunting taboos on the colobus monkeys complement the formal nature conservation agenda. Etiendem et al. (2011) assessed local beliefs associated with the Cross River gorilla and taboos against hunting and eating of the gorilla in Cameroon and then discussed the usefulness of incorporating such beliefs and practices into the conservation of the species.

In Indonesia also, several case studies have focused on local resource management practices based on supernatural enforcement mechanisms. For example, Wadley and Pierce Colfer (2004), who conducted field research on human ecology in West Kalimantan, revealed that sacred forest patches (the sites of human death or burials and those claimed to be inhabited by nonhuman spirits) are important for wildlife and, as a result, are important game sources. Kanto (2008), who analyzed the relationship between *adat* land (customary land managed by *adat* law) and the local belief in divinities that are believed to dwell in the land, revealed that such belief



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Conservation value of less-intensively managed human modified forests formed through ‘arboriculture’

What is arboriculture?

- **Arboriculture: Utilization, cultivation, protection of useful arboreal plants**

Useful arboreal plants:

- Plants used consumptively for food, medicine, construction materials, handicraft materials, etc.
- Plants used non-consumptively for purposes of shading, windbreak, attracting animals (for trapping), etc.

- **Subsistence systems in Wallacea and Near Oceania: "Arboreal-based Economy"**

Arboreal-based economy:

"Subsistence economy whose practitioners meet a majority of their dietary, nutritional and economic needs through the exploitation of arboreal resources including located in or proximate to a forest environment [e.g. forest game animals]" [Latinis 2000:43]

National park, parrot, and arboriculture

- **Established in 1989. One of its main expected functions: to help conserve a flagship species, Moluccan cockatoo**

CITES1-listed, protected parrot, Moluccan cockatoo (*Cacatua moluccensis*)

- **Many Human-Modified Forests (HMFs) are created and maintained through arboriculture in and around the NP**

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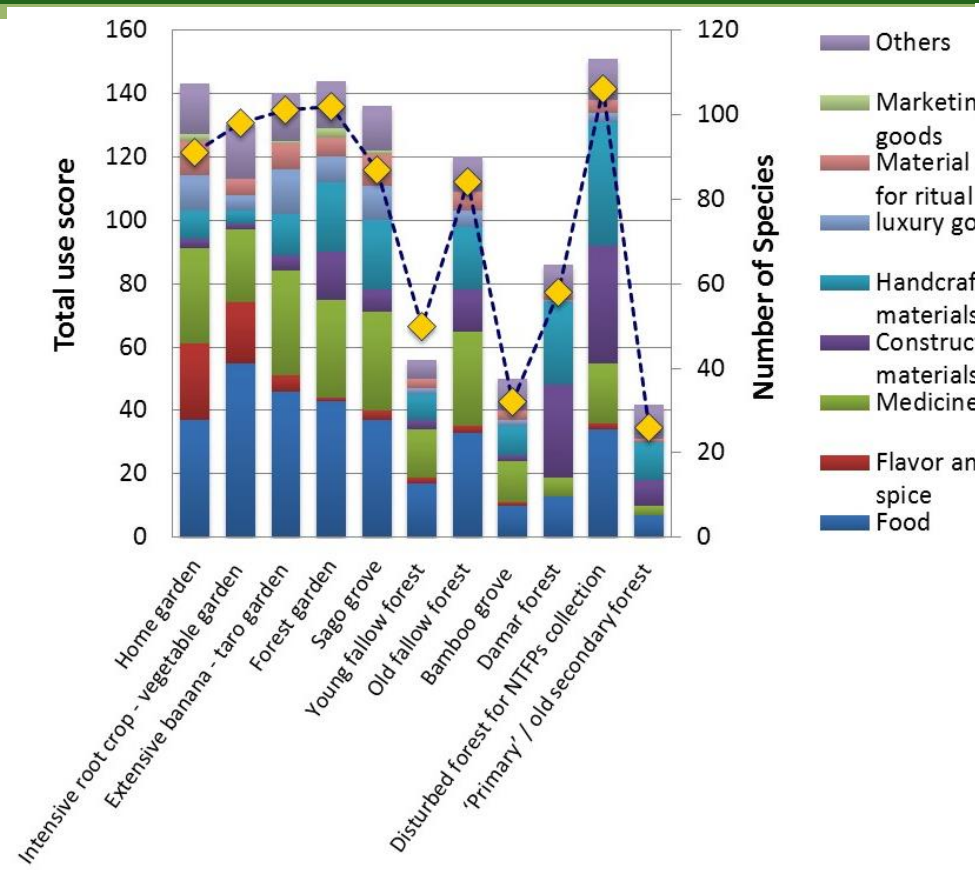
Folk categories of land in Amani oho

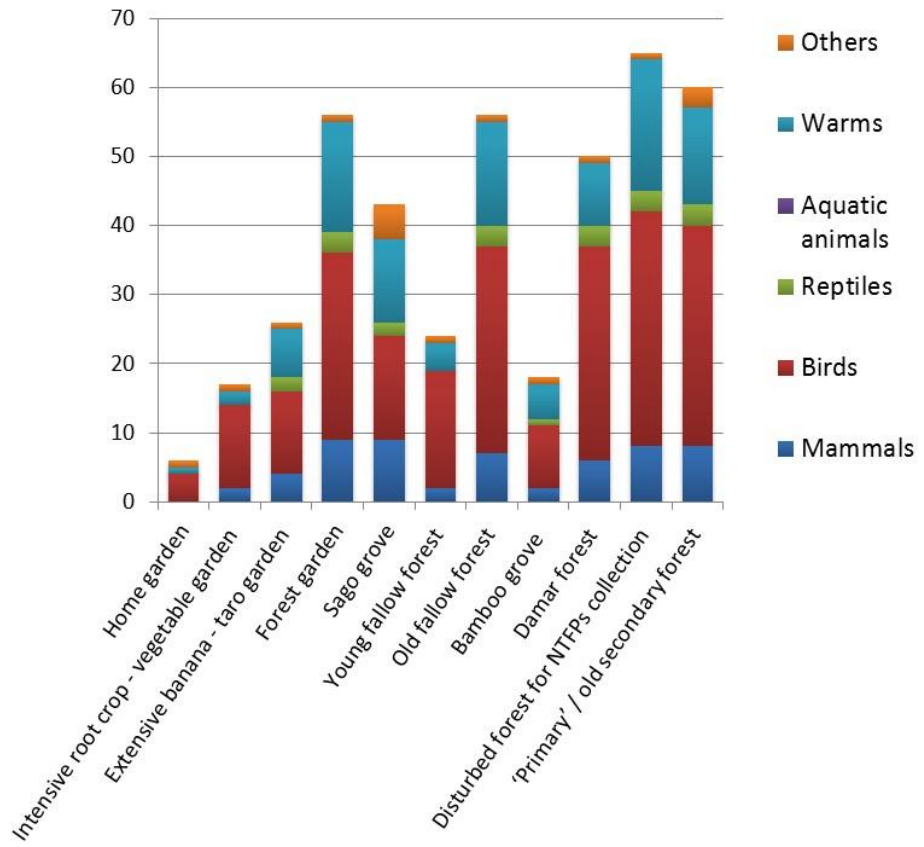
Land types	HMFs	Land use
1. **Residential land and home garden (*Amania*)**		Residential land and home garden with coconut palm, betel nut palm, and various herbs.
2. **Intensive root crop - vegetable garden (*Lela*)**		Intensively managed garden , of which main crops are taro, cassava, sweet potato, vegetables, tobacco, sugar cane, etc.
3. **Extensive banana - taro garden (*Lawa*)**		Extensively managed garden with banana and taro.
4. **Forest garden (Lawa aihua)**	X	Mixed tree garden with fruits trees (durian, jackfruits, etc.) and wild trees
5. **Sago grove (*Soma*)**	X	Sago palm (*Metroxylon sago*)grove that supply sago starch, staple food for local people.
6-7. **Cultivatable land and fallow forest (*Lukapi*)**		Cultivatable land where huge roots of trees have decayed and fallow forest that was formed in the ex-*lela* and ex-l*awa.*
6. **Young fallow forest (*Lukapi holu*)**	X	Fallow forests with relatively small young trees that can be cut by machete (parang).
7. **Old fallow forest (*Lukapi mutuani*)**	X	Fallow forests with relatively large trees that cannot be cut by machete .
Itawa* forest *(Itawa harie)	X	*Litsea mappacea* - dominated forest s that are used as a trapping ground for edible wild birds.
8. **Bamboo grove (*Awa harie* etc.)**	X	Bamboo grove made by local people. Several species of Bamboo are used as handicraft materials, fuel wood, etc.
9. **Damar forest for resin collection (*Kahupe harie*)**	X	*Agathis damara* - dominated forest that has been made and maintained by local people and used for resin (damar) collection.
10. **Disturbed forest for NTFPs collection (*Airima harie*)**	X	Semi-disturbed natural forest used for collecting fuel wood, construction timber, rattan, etc.
11. **'Primary' / old secondary forest for hunting/ trapping (*Kaitahu*)**	X	'Primary' and mature secondary forest situated far from the village settlement and used for hunting /trapping grounds.

Various forest provisioning services from HMFs (1/2)



Plant resources

Note: "Total use scores" were counted in the following way: For example, cassava has 2 use scores for food since the roots as well as the leaves of cassava can be eaten.

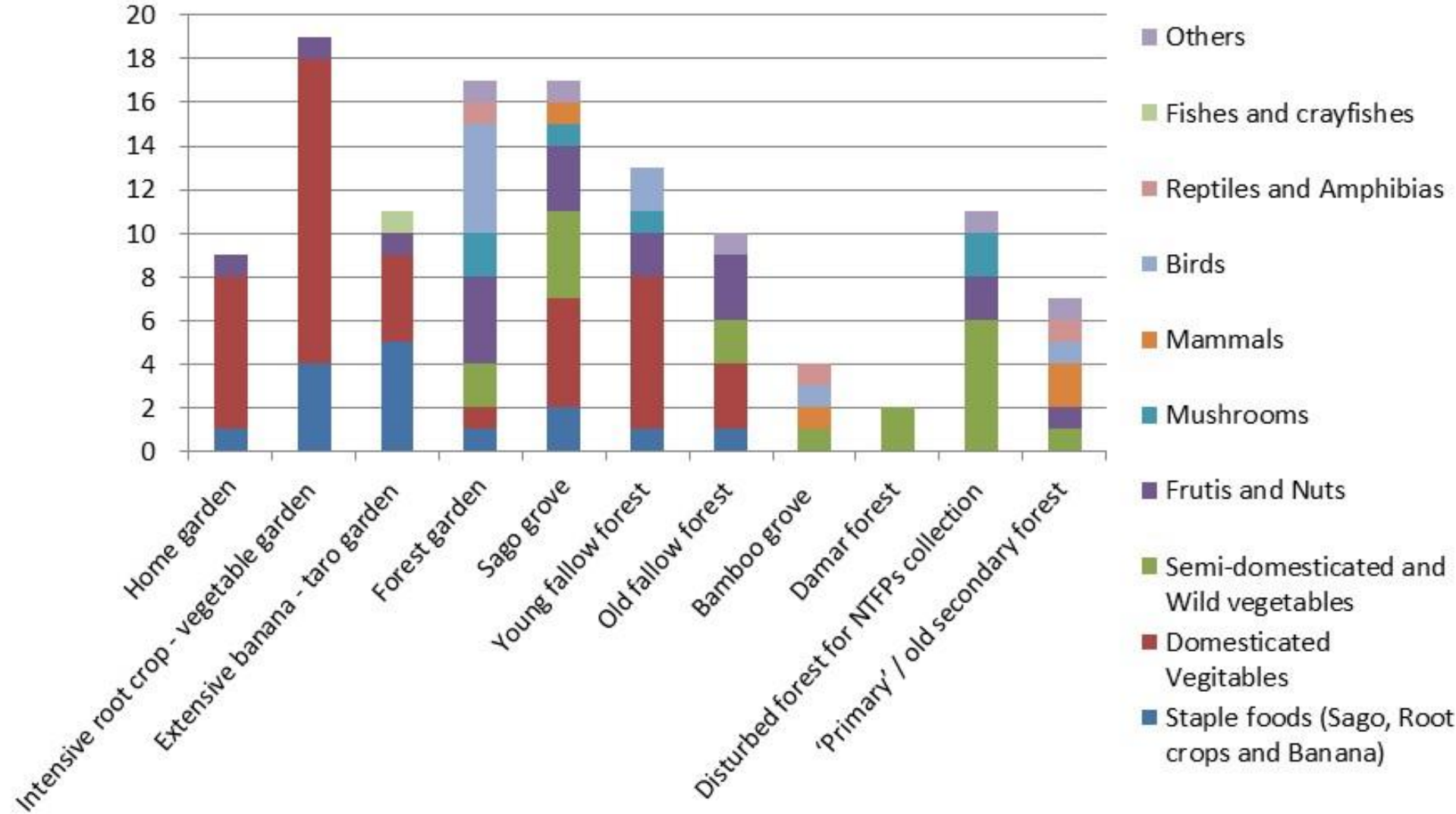


Animal resources

Note: These animal resources are mostly used for food.

Number of harvestable plant and animal resources in each land type

Various forest provisioning services from HMFs (2/2)



Number of food resources

(14 house holds for 16 days in Feb 2012)

Arboricultural activities in various types of HMF

Folk categories of land in Amani oho

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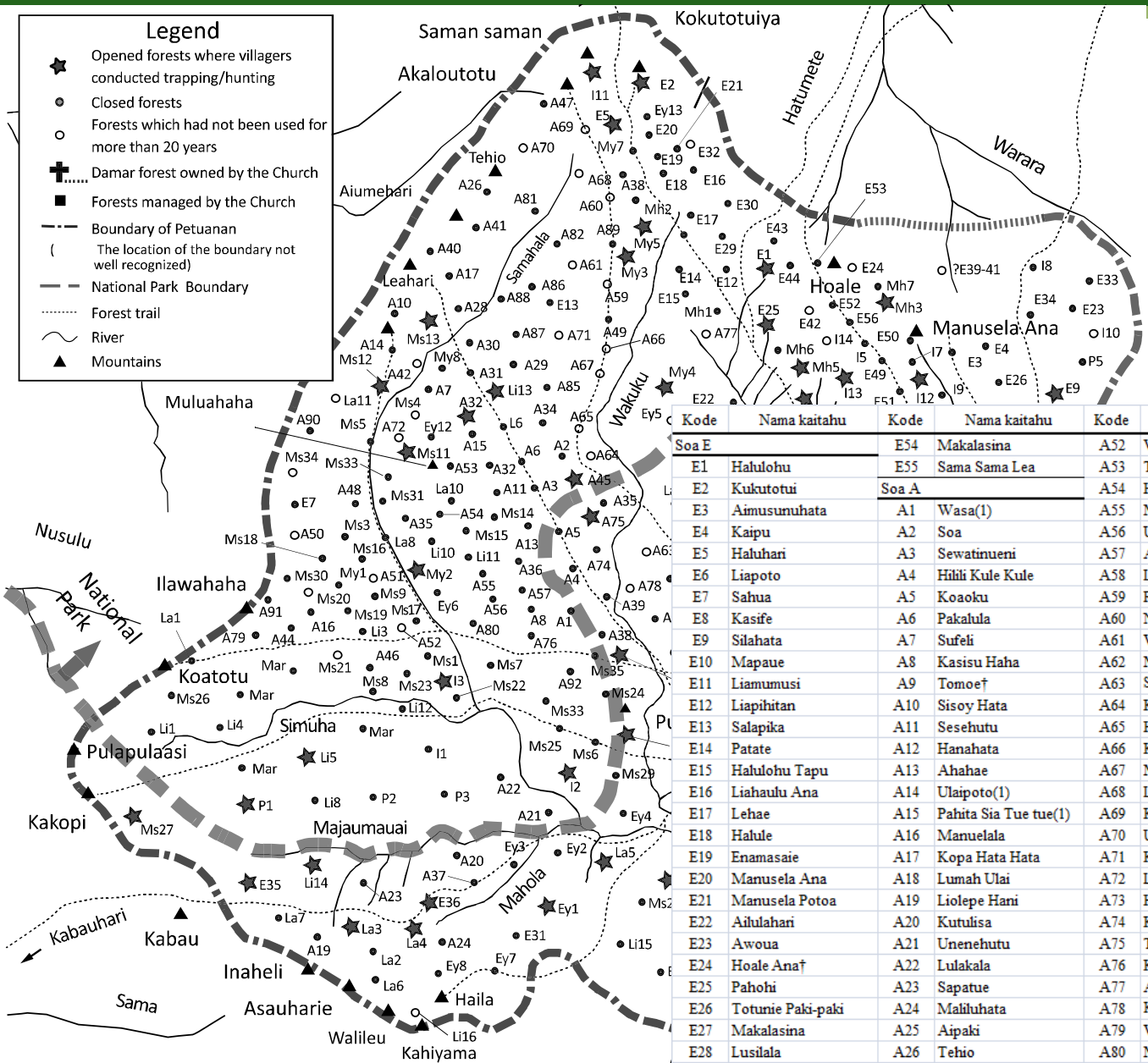
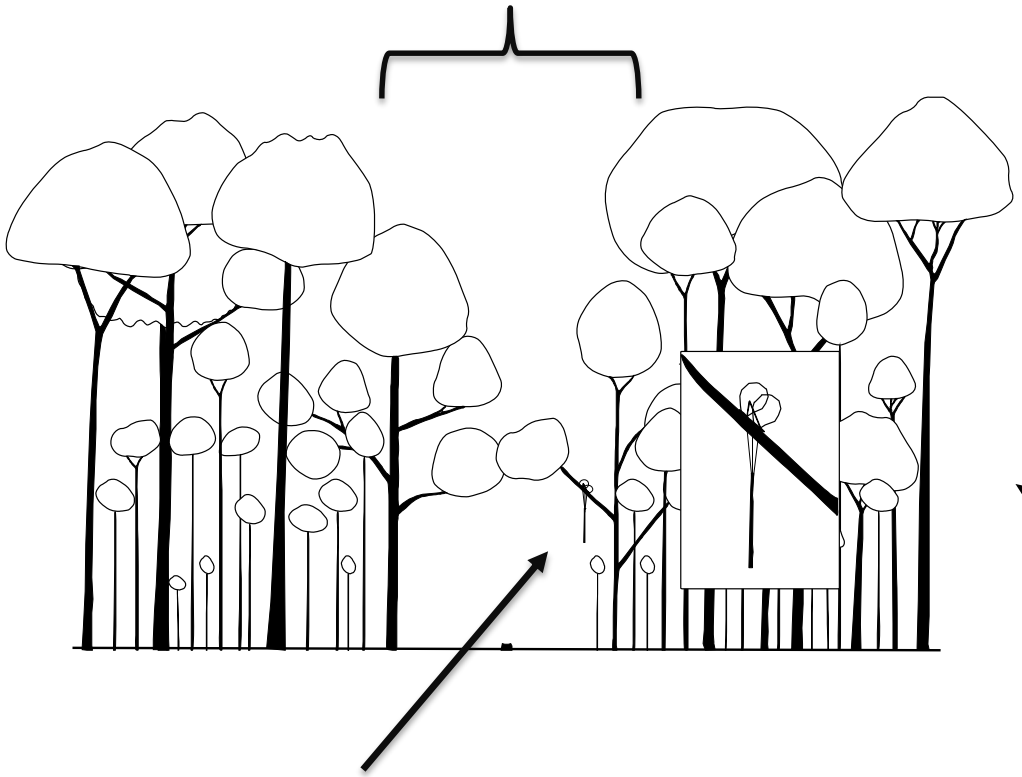
(1) Arboriculture in kaitahu (primary/ old secondary forests used as hunting grounds)



Kode	Nama kaitahu	Kode	Nama kaitahu	Kode	Nama kaitahu	Kode	Na
Soa E		E54	Makalasina	A52	Wasa(2)†	Li13	Lialeloh
E1	Halulohu	E55	Sama Sama Lea	A53	Tiapohuhu	Li14	Melute
E2	Kukutotui	Soa A		A54	Hatuoto	Li15	Tuahat
E3	Aimusunuhata	A1	Wasa(1)	A55	Mulua Haha	Li16	Kahiya
E4	Kaipu	A2	Soa	A56	Utalohu	Soa My	
E5	Haluhari	A3	Sewatinueni	A57	Atauhata	My1	Kikulih
E6	Liapoto	A4	Hilili Kule Kule	A58	Lilihalahari	My2	Tapuar
E7	Sahua	A5	Koaoku	A59	Ramauhena†	My3	Atauhu
E8	Kasife	A6	Pakalula	A60	Nisaispateia†	My4	Maroh
E9	Silahata	A7	Sufeli	A61	Waeula†	My5	Mamar
E10	Mapaue	A8	Kasisu Haha	A62	Malilukola	My6	Tifu
E11	Liamumusi	A9	Tomoe†	A63	Suhula Sana Kete Kete†	My7	Lemai
E12	Liapihitan	A10	Sisoy Hata	A64	Koriwahatae†	Soa Ms	
E13	Salapika	A11	Sesehutu	A65	Hatutuhu†	Ms1	Amanil
E14	Patate	A12	Hanahata	A66	Kohaha†	Ms2	Waese
E15	Halulohu Tapu	A13	Ahahae	A67	Matakaitupa†	Ms3	Haiman
E16	Liahaulu Ana	A14	Ulaipoto(1)	A68	Lumu Panu Panu†	Ms4	Sotitai
E17	Lehae	A15	Pahita Sia Tue tue(1)	A69	Kahupe Hatukesu†	Ms5	Anania
E18	Halule	A16	Manuelala	A70	Uwaela†	Ms6	Masala
E19	Enamasaie	A17	Kopa Hata Hata	A71	Kaulata Rahe Koria†	Ms7	Marilak
E20	Manusela Ana	A18	Lumah Ulai	A72	Lianahu Hatu†	Ms8	Omako
E21	Manusela Potoa	A19	Liolepe Hani	A73	Hatusuha	Ms9	Hathur
E22	Ailulahari	A20	Kutulisa	A74	Kalae Pola-pola	Ms11	Wekela
E23	Awoua	A21	Unenehutu	A75	Taumusunue	Ms12	Silahut
E24	Hoale Ana†	A22	Lulakala	A76	Korie Waihitu	Ms13	Kokani
E25	Pahohi	A23	Sapatue	A77	Aimakasana†	Ms14	Haluha
E26	Totunie Paki-paki	A24	Maliluhata	A78	Keilekesana Kete-kete†	Ms15	Atamar
E27	Makalasina	A25	Aipaki	A79	Wekela(1)	Ms16	Malilu M
E28	Lusilala	A26	Tehio	A80	Mileu Kori Tupe	Ms17	Foutih

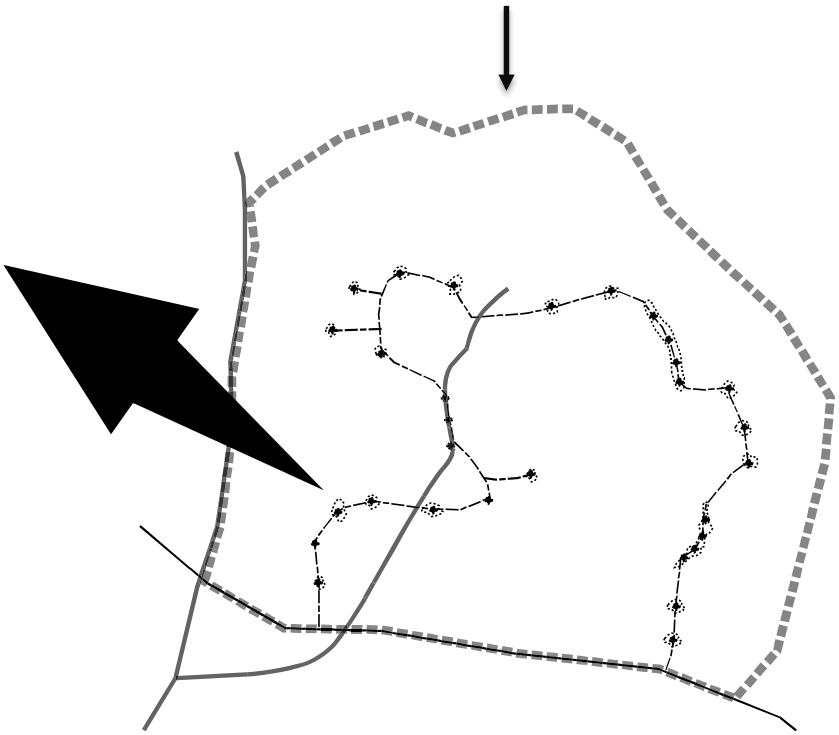
Setting traps for cuscus

Natural and artificial gap



***Sohe*, weighted noose trap**

Boundary of *a kaitahu*



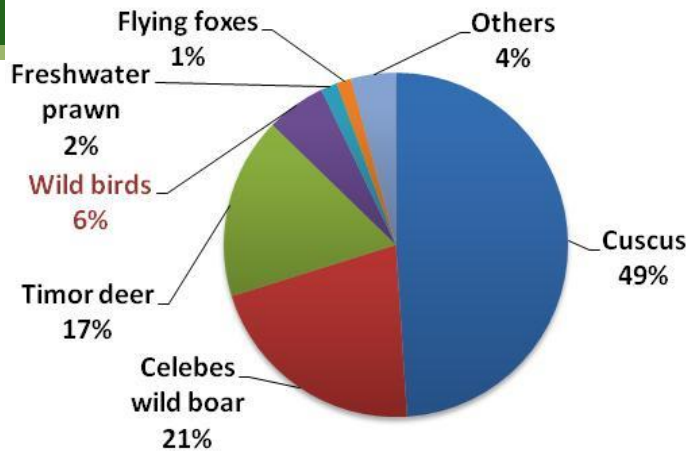
Protection of trees used by cuscus

- **Trees, fruits of which are eaten by cuscus**
  - Atau (*Syzygium luzonense*)
  - Masapa (*Syzygium malaccense*)
  - Haana (*Gordonia excelsa*)
  - Kori (*Lithocarpus celebicus*)
- **Trees, sap of which are lapped by cuscus**
  - Supa (*Ficus* sp)
  - Airula (?)
  - Solaoto (?) etc

Atau (*Syzygium luzonense*)

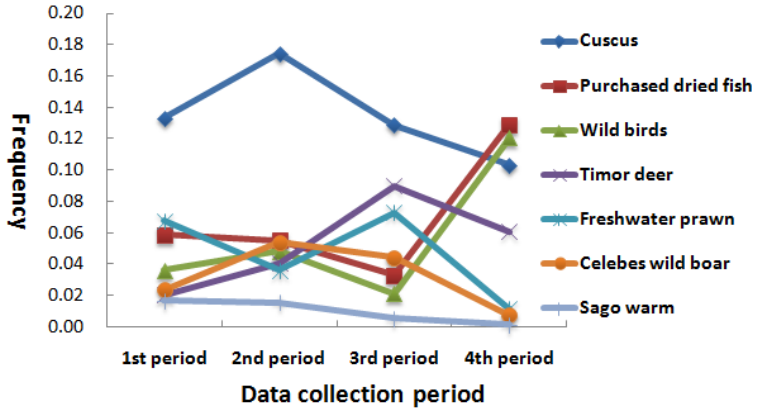
Solaoto (?)

(2) Arboriculture in *Itawa* forest



Dietary intake of main animal resources (in terms of amount of protein)

Source: Field research
Note: The proportions was calculated on the basis of the number of animal resources caught by 15-19 households during 4 data collection periods (duration of each period is 18-29 days. The total data collection duration was 89 days).



Frequency of animal foods in dietary intake

Source: Field research
Note: The figure shows the frequency of only 7 most frequently eaten animal foods in dietary intake.

Frequently trapped wild birds

Gymnophaps mada

Ptilinopus superbus

Aceros plicatus

- **Around 50 species trapped for subsistence purposes (food)**
- **Most of them are Columnbidae birds**

  ***Gymnophaps mada* (local name: *mavene*)**
  ***Ptilinopus superbus* (*ovota*)**
  ***Columba vitiensis* (*nieli*)**
  ***Macropygia amboinensis* (*pilaka*)**
  ***Aceros plicatus* (*ka*) etc.**

Trees used for catching wild birds and bats

Local name	Scientific name	Fruiting season	Wild birds and bats
Trees which are not felled when clearing land for agriculture			
Oma	*Artocarpus* sp.	Feb-Apr	*solo musunu (Pteropus sp), solo puti (Pteropus sp)*
Leha	*Symplocos cochinchinensis* (Lour.) Moore	Dec-Jan	*fufualo(?), makatola(Basilornis corythax), mavene(Gymnophaps mada), ovota (Ptilinopus superbus), uniuni (Zesteropus Kuehni)*
Awou Tuni	*Prunus arboreus* (Blume) Kalkman	Jan-Feb	*fufualo, mavene, ovota*
Awou Lasa	*Prunus grisea* Kalkman	Jan-Feb	*fufualo, mavene, ovota*
Ketapi	*Geniostoma* sp.	May-Jul	*mavene, ovota*
Trees, the growth of which is encouraged through seedling and protection			
Itawa Kopi	*Litsea mappacea*	Jan-Feb	*fufualo, ka (Aceros plicatus), lesoa (Ivos affinis), loe (Phiemon subcorniculatus), manu putia (Ducula bicolor), makatola, mavene, nieli (Columba vitiensis), sisai (Alisterus Amboinensis), totoro(?), ovota*
Itawa Tuni	*Litsea mappacea*	Mar-Apr	*fufualo, ka, lesoa, loe, manu putia, makatola, fufualo, ka, lesoa, loe, manu putia, makatola*

Source: Field research

Itawa (*Litsea mappacea*) dominated forest

Itawa forest

- *Itawa* forest patchily distributed in fallow forest
- The largest one: around 1 ha

Human interventions:

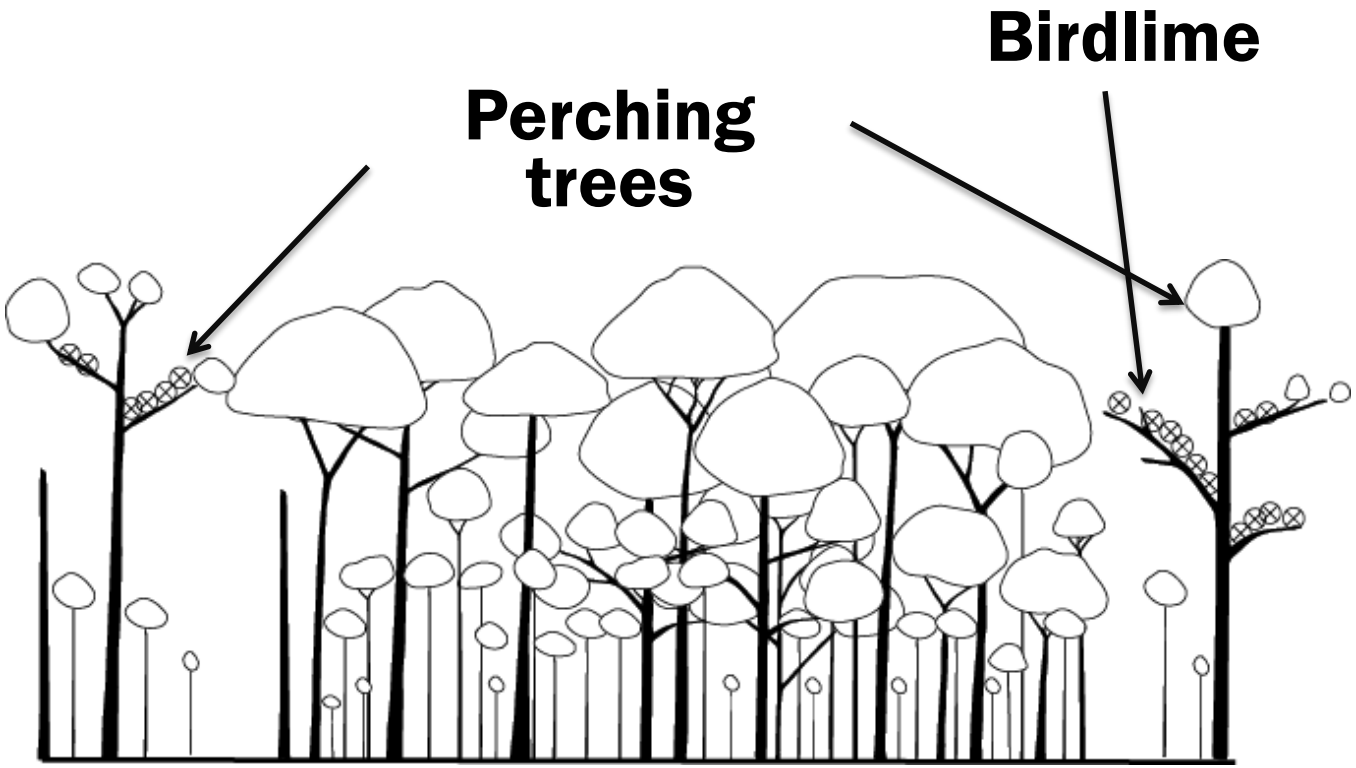
- Weeding, clearing underbrush, and cutting vines (Jan.-Apr.)
- Cutting and barking trees covering *Itawa*
- Collecting seeds of Itawa and seeding land

Itawa tuni (*Litsea mappacea*)

Use of Itawa forest as a trapping ground

Birdlime made from sap of *oma* (*Artocarpus* sp)

Villager setting birdlimes on a tree



***Itawa* - dominated forest**

(3) Arboriculture in Forest garden

- Mixed fruits tree garden with durian, langsat, jackfruit, water rose apple, etc.
- Formed by planting seedlings or protecting wild seedlings and young trees – mainly dispersed by wild bats (*Pteropus* sp.)
- Mainly distributed in old secondary forest, with a few in 'primary' forest
- Less-intensively managed : Underbrush and vines cut only when harvesting → mixed with many wild plants, no clear boundaries

Forest garden mixed with many wild plants

Villagers harvesting durian

(4) Arboriculture in Damar Forest

- *Agathis damara* - dominated forest used for resin (damar) collection
- Formed by selective protection of wild seedlings and young trees
- Patchily distributed in 'primary' and old secondary forests
- Damar is used as a fuel for lamps and kindling; was an important income source up to the mid 1960s
- Felling and barking are strictly forbidden

Damar /copal

Agathis damara-dominated forest

Importance of HMFs as parrot habitats

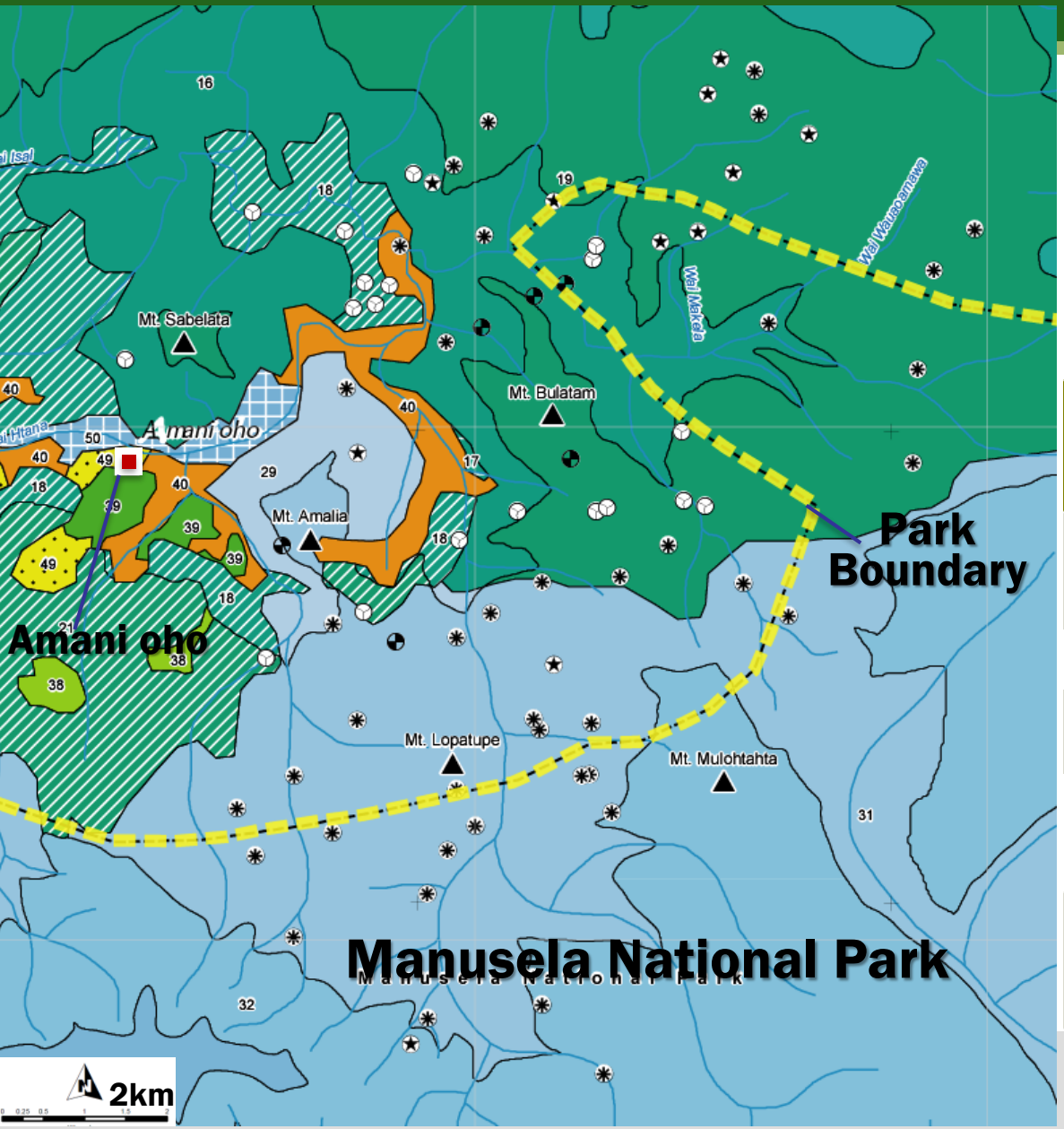
Utilization of HMFs by Moluccan cockatoo

Forest types	Utilization	Season
Forest garden	● Eats fruits of durian, langsat, jackfruit	Jan.-May.
Damar forest	● Eats fruits of Agathis damara ● Nests in tree hollows of large dead Agathis damara	All year around

Feeding scars of Moluccan cockatoo on the fruit of durian (left) and *Agathis damara* (right)

Agathis damara

Sites where Moluccan cockatoos frequently seen or heard



: Primary/old secondary forest

: Damar forest

: Forest garden

: Forest garden with damar trees

Forest types	Number of the site	Number of the site inside the NP
Primary/old secondary forest	11	3
Damar forest	42	16
Forest garden	19	2
Forest garden with damar trees	6	1

Illegal !

Source: Field work (Feb. 2012)
Note: 78 cockatoo sites were identified by the interviews with 26 villagers.

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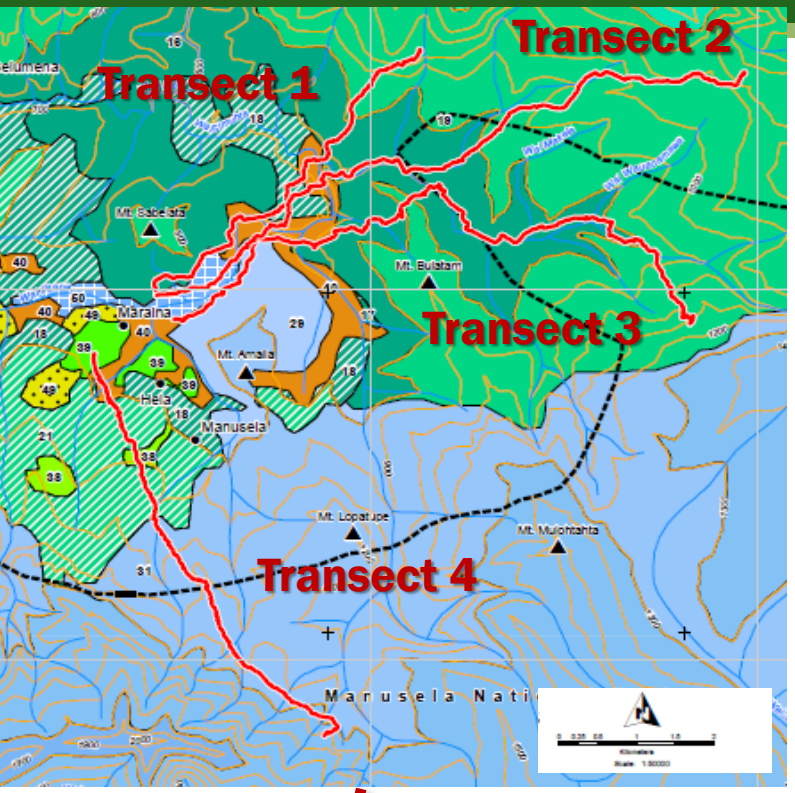
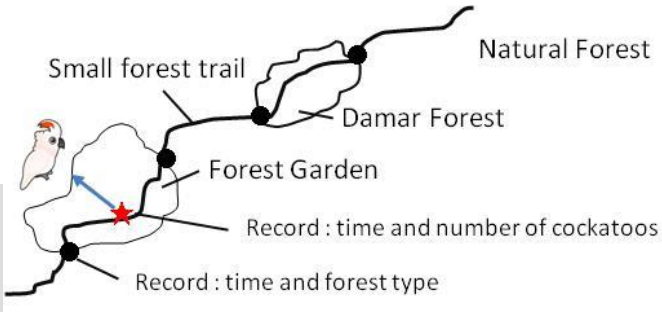
Participatory parrot transect survey



Rute	Length of transect (km)	The lowest altitude (m)	The highest altitude (m)	Number	
				Feb. 2012 (Fruiting / wet season)	Sep. 2012 (Non-fruiting / dry season)
Rute-1	9.4	860	1190	8	8
Rute-2	11.3	800	990	6	10
Rute-3	8.5	840	1410	10	10
Rute-4	5.6	790	1140	10	10
			Total	34	38

Note: Figures of altitude were rounded off to the ten's place.

Forest type	Fruiting season (Feb. 2012)	Persen-tage (%)	Non-fruiting season (Sep. 2012)	Persen-tage (%)
Ka	123989	45%	157887	47%
KH	39616	14%	51322	15%
LaAi	42973	16%	39674	12%
AH	19428	7%	24607	7%
LM	9031	3%	9540	3%
DB	18059	7%	24620	7%
KC	5817	2%	8825	3%
So	18177	7%	20083	6%



Ka Primary forest/ mature secondary forest (*kaitahu*)
KH Damar forest (*kahupe hari*)
LaAi Forest garden (*lawa aihua*)
AH NTFP collection forest (*airima hari*)
LM Old fallow forest (*lukapi mutuani*)
DB Bamboo forest (*dusun bambu*)
KC Cacao garden (*kebun cokorat*)
So Sago grove (*soma*)

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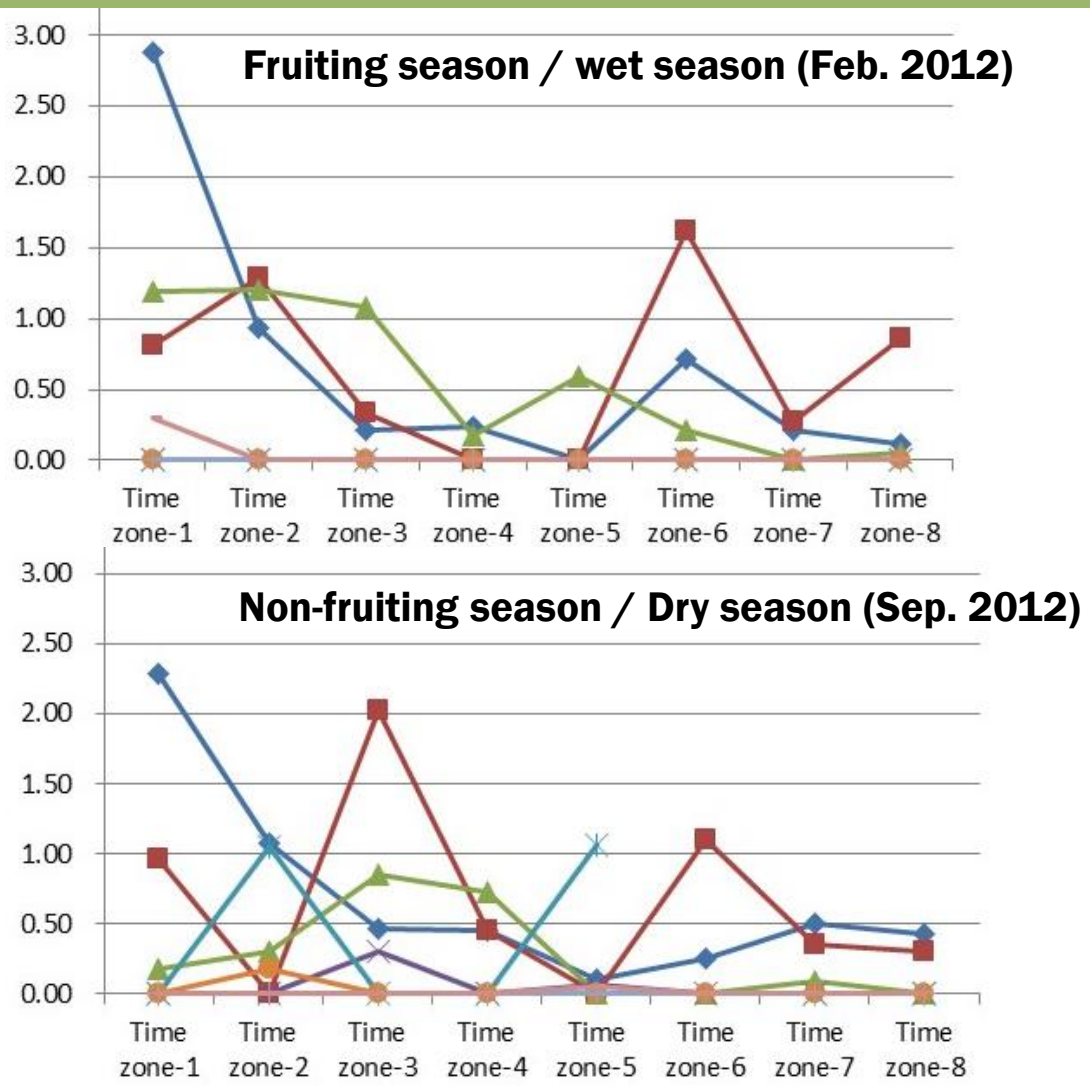
Relative abundances of Moluccan cockatoo（Number/1000m）

Forest type	Time zone-1 (6:30-8:00)	N	Time zone-2 (8:00-9:00)	N	Time zone-3 (9:00-10:00)	N	Time zone-4 (10:00-11:00)	N	Time zone-5 (11:00-12:30)	N	Time zone-6 (14:30-16:00)	N	Time zone-7 (16:00-17:00)	N	Time zone-8 (17:00-18:00)	N	P
Fruiting season/wet season (Feb. 2012)																	
'Primary' / old secondary forest	2.88	27	0.94	25	0.21	28	0.24	27	0.00	33	0.72	26	0.21	20	0.12	15	0,001***
Damar forest	0.81	30	1.29	14	0.34	11	0.00	13	0.00	7	1.62	8	0.27	13	0.86	22	0,308
Forest garden	1.19	35	1.20	25	1.08	14	0.18	19	0.59	17	0.21	13	0.00	20	0.06	20	0,052*
NTFP collection forest	0.00	4	0.00	9	0.00	12	0.00	7	0.00	8	0.00	9	0.00	15	0.00	8	1000
Old fallow forest	0.00	15	0.00	6	0.00	3	0.00	3	0.00	6	0.00	3	0.00	6	0.00	9	1000
Bamboo grove	0.00	12	0.00	19	0.00	14	0.00	8	0.00	6	0.00	10	0.00	19	0.00	10	1000
Cacao garden	0.00	9	0.00	2	0.00	1	0.00	14	0.00	14	0.00	6	0.00	2	0.00	5	1000
Sago grove	0.30	21	0.00	14	0.00	9	0.00	10	0.00	18	0.00	18	0.00	6	0.00	14	0,286
P	0,009***		0,029**		0,141		0,799		0,142		0,044**		0,254		0,239		
Non-fruiting season / dry season (Sep. 2012)																	
'Primary' / old secondary forest	2.29	34	1.08	24	0.47	25	0.45	33	0.10	39	0.26	24	0.51	29	0.43	28	0,010**
Damar forest	0.97	40	0.00	14	2.03	10	0.45	11	0.00	12	1.10	12	0.36	19	0.31	30	0,036**
Forest garden	0.18	31	0.30	22	0.85	12	0.73	11	0.00	19	0.00	17	0.09	17	0.00	17	0,747
NTFP collection forest	0.00	4	0.00	4	0.30	12	0.00	12	0.07	13	0.00	10	0.00	13	0.00	4	0,412
Old fallow forest	0.00	11	1.05	17	0.00	2	0.00	3	1.07	9		0	0.00	9	0.00	12	0,763
Bamboo grove	0.00	17	0.18	22	0.00	11	0.00	10	0.00	15	0.00	9	0.00	16	0.00	20	0,726
Cacao garden	0.00	21	0.00	8	0.00	2	0.00	7	0.00	17	0.00	9	0.00	5	0.00	14	1000
Sago grove	0.00	25	0.00	11	0.00	20	0.00	5	0.06	27	0.00	19	0.00	3	0.00	18	0,809
P	0,000***		0,000***		0,008***		0,134		0,574		0,081*		0,158		0,054*		

Note1: Kruskal Wallis test.
Note 2: * Significant level 10 %; ** Significant level 5 %; *** Significant level 1 %.
Note 3: Relative abandance = [numbers of observed cockatoo]/[length of a transect unit].

Relative abundances of Moluccan cockatoo（Number/1000m）



Note: Relative abundance =N/D

N=Number of cockatoos observed

D=Distance observers walked

Note: Time zone-1 6:30-8:00; Time zone-2 8:00-9:00; Time zone-3 9:00-10:00; Time zone-4 10:00-11:00; Time zone-5 11:00-12:30; Time zone-6 14:30-16:00; Time zone-7 16:00-17:00; Time zone-8 17:00-18:00.

Use of HMFs by other wild animals

Species	Type of HMFs	Utilization
Celebes Wild Boar (Sus celebensis)	Fallow forest (*lukapi*), sago groves, bamboo grove	Eating fruits of durian and jackfruits (fruits fallen on the ground), bamboo shoot, etc.
Grey Cuscus (Phalanger orientalis)	Fallow forest , sago groves, forest garden, human-modified forest parches in old natural forest	Eating leaf stalk of sago palm, fruits of *atau (Syzygium luzonense)*, *masapa (Syzygium malaccense)* etc. Licking sap of *solaoto* (*?*)
Bat (*Pteropus sp*)	Forest garden, bamboo grove, forest garden, sago grove, *lukapi*	Eating fruits of sugar palm, langsat, jackfruits, oma, guava, water rose apple etc.
Malayan Civet (*Viverra tangalunga)*	Forest garden, fallow forest	Eating banana, fruits of durian, jackfruits, papaya, pine apple, etc.
Lories (*Eos bornea, Alisterusamboinensis etc)*	Forest garden	Eating Banana and durian
Papuan Hornbill (*Aceros plicatus)*	*Itawa* (*Litsea mappacea)* dominated forest	Eating fruits of Itawa
Wild birds (*Gymnophaps mada, Ptilinopus superbus etc.)*	*Itawa* (*Litsea mappacea)* dominated forest, edges of garden	Eating fruits of Itawa, leha (*Symplocos cochinchinensis*), awou (*Prunus grisea*), ketapi (*Geniostoma* sp.) etc.

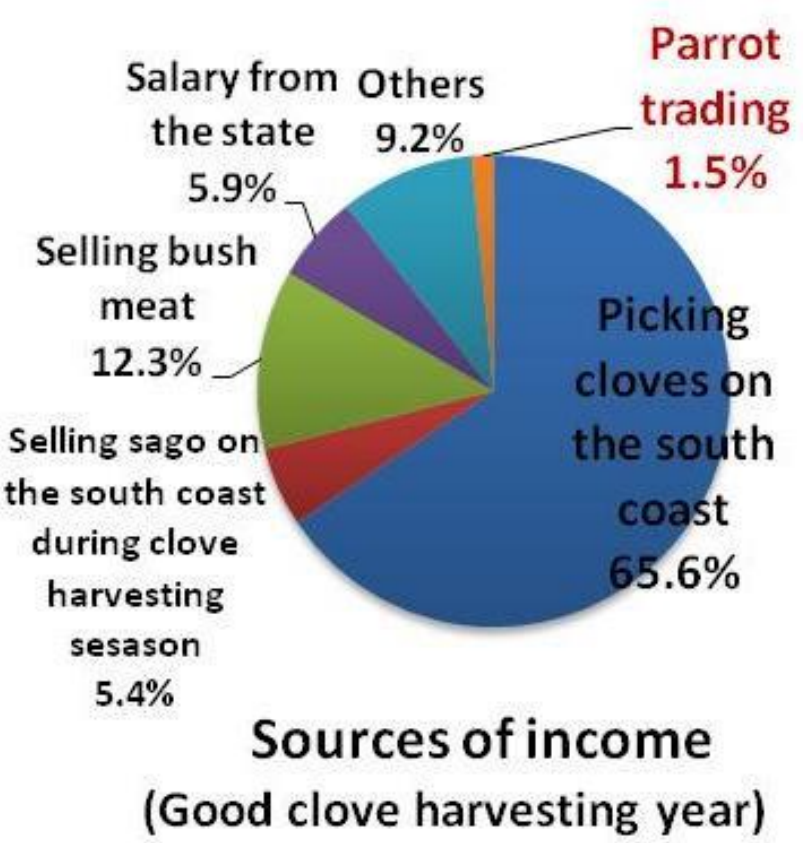
[c.f.] Parrot trapping

A cockatoo caught by a trap set on a durian tree

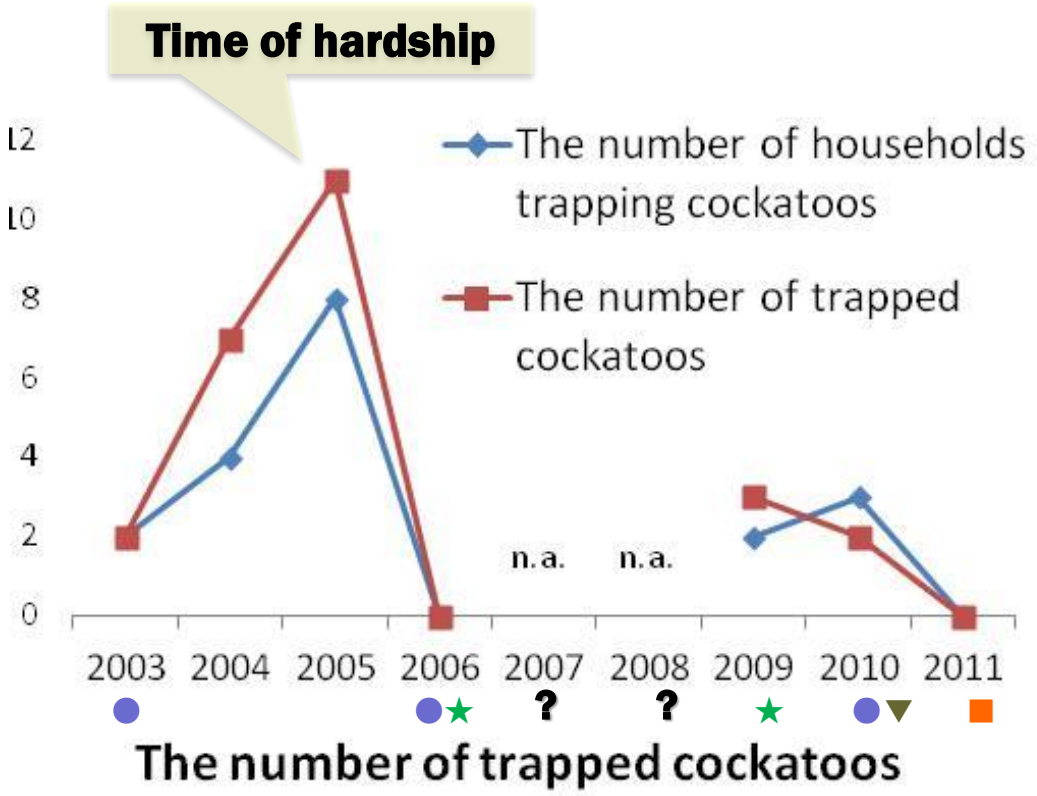
A Moluccan cockatoo trap

A trapped cockatoo for sale at the coast

[c.f.] Parrot: as a supplemental, remedial source of income in times of hardship



Sources of income
(Good clove harvesting year)



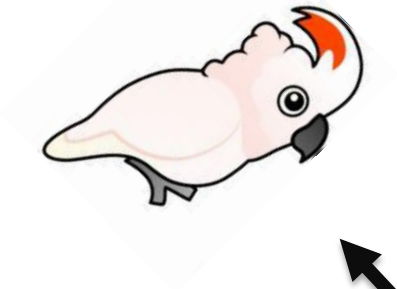
The number of trapped cockatoos

●: high clove income, ★: government/NGO – sponsored project, ■: working on oil palm plantations, ▼: selling butterflies

* Proportion was estimated based on data collected by using self- administered sheets during 4 data collection periods (total 89 days) in 2003. Informants were14 heads of households.

* Data was collected by one-on-one interviews with all heads of households in 2004, 2005, 2007, 2010 and 2012.

[c.f.] Interrelationship between Moluccan cockatoo and humans



Trap the parrots in times of hardship

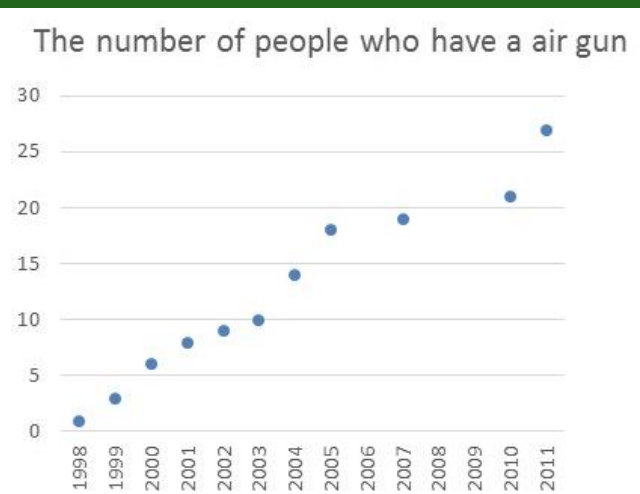
Provide various forest provisioning services

Provide foraging and nesting sites

Arboriculture

HMFs

[c.f.] Moluccan cockatoo: A target of air gun hunting

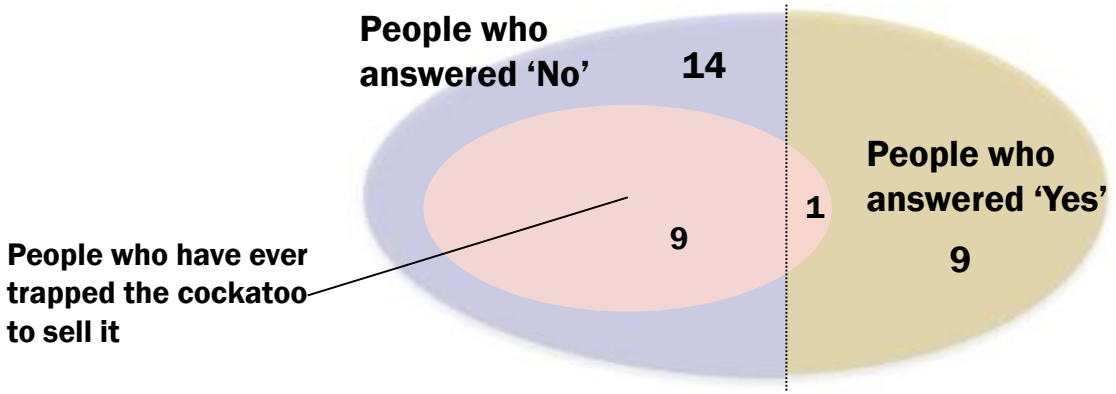


The number of trapped and shot cockatoo

	2003	2004	2005	2006	2007	2008	2009	2010	2011
The number of trapped cockatoo	2	7	11	0	n.a.	n.a.	3	2	0
The number of shot cockatoo(estimated number)	41	35	14	15	n.a.	n.a.	11	2	28

Source: Fieldwork

If you see the cockatoo, will you shoot it?



Source: One-on-one interviews with all villagers who own a air-gun (23 villagers) (Feb. 2012)

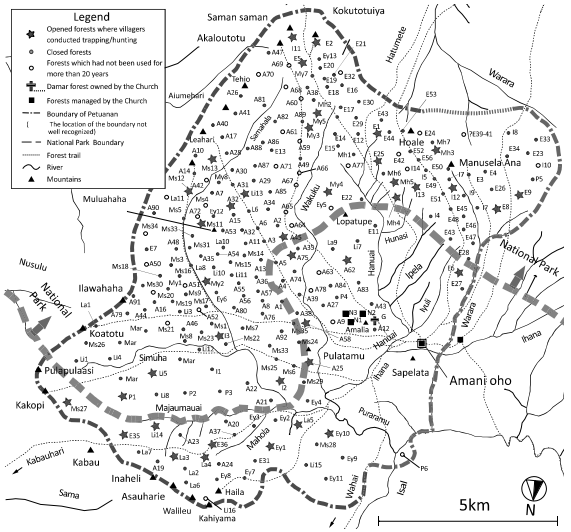
Discussion-2

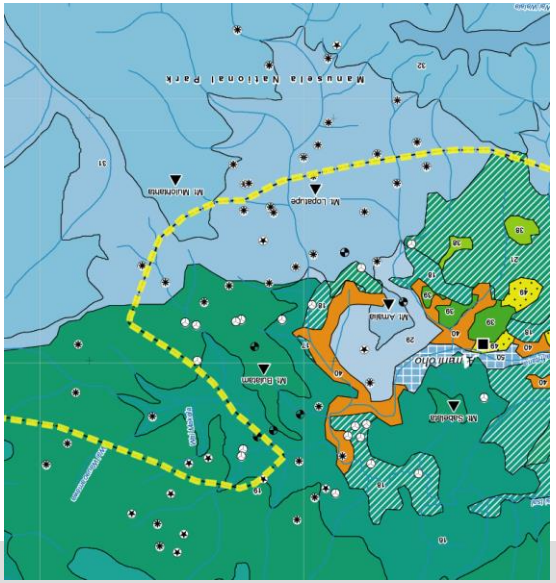
- Various HMFs formed through arboriculture enable the local people to enjoy a variety of forest provisioning services
- Among those HMFs, less-intensively managed forest gardens and damar forests, some of which are located inside the park, are functioning as important parts of the cockatoo's habitats as foraging and nesting sites

Implications:
Examining the validity of conventional zone-based conservation model

Problems of conventional zone-based conservation model

- ゾーニングに依拠した公園管理は、「人間=自然(生物多様性)の破壊者/(潜在的)脅威」とみなす考え方を基礎に人間活動を公園一部区域で限定的に許容し➔ その他の土地は住民を排除する地域として固定することで「自然」を守ろうとするもの
- セラム島山地民社会の文脈では少なくとも次の二つの点で問題
  1. 広大なカイタフ(原生林・老齢二次林)をスポラディックかつ循環的に利用する山地民の猟のあり方と相容れない
     - 国の法的規制が既存の資源利用秩序を崩壊させ資源劣化を導く可能性 **[Hutton and Dickson 2001: 448-449]**
     - マヌセラにおいても、ゾーニングに依拠した厳格な管理が実行されれば、もともと在地の規範によって精緻な境界区分と柔軟で適応的なアクセスコントロールの仕組みが崩壊する恐れ
  2. 公園内にパッチ状に展開するアーボリカルチャーを制限し、それを媒介とする人と生き物の相互関係を壊す
     - インドネシアでは、**traditional zone**でも**special zone**でも非木材林産物の採取はみとめても樹木の伐採は認められないことが多い
     - 広大な天然林に分散する非集約管理された**HMFs**がオオバタンにとって良好な生息環境を創出・維持しているならば、特定の狭い区域でアーボリカルチャーを促し(集約化？)、他区域では人為を排除するような管理モデルは、オオバタン保全にとって必ずしも有効な施策とはいえない
     - 他の生きものにとっても同様**(?)**





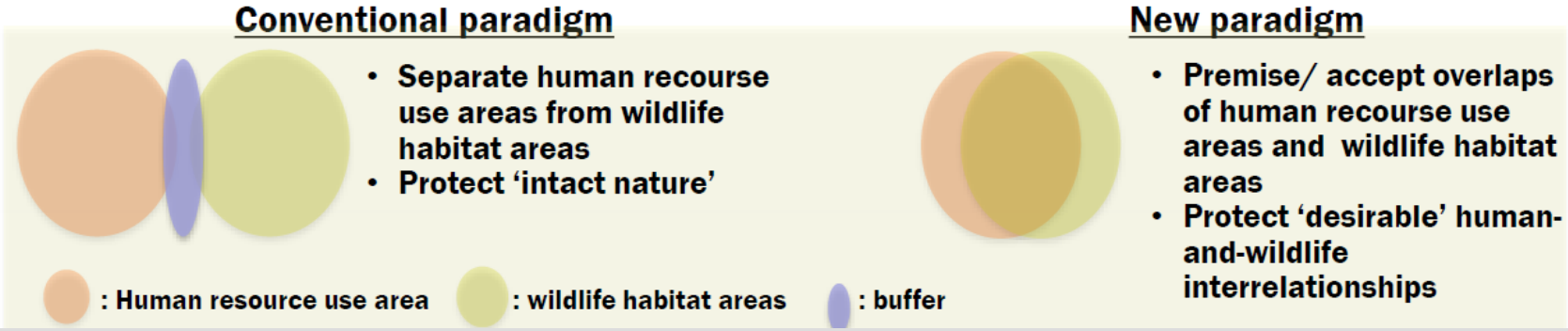
Toward conservation focusing on protection of ‘desirable’ human-wildlife relationships

- 求められる国立公園管理
  - 周辺住民による**sporadic**で非集約的な猟とアーボリカルチュアを認めるより柔軟な管理→慣習的な資源・土地利用が認められる区域を特定の狭い土地に限定するのではなく公園内の大部分を住民が利用可能な区域としつつ、大規模開発が公園内に及ぶのを厳格に排除・・・細かなゾーニングよりも行為主体に応じた柔軟な規制に基づく管理

    It might be needed to apply more flexible management measures to allow local people to conduct sporadic and less-intensive trapping and arboriculture under certain conditions inside NP

- より一般的なインプリケーション：「自然／文化の二元論**(Nature-culture dichotomy)**」に基づく排除型・隔離型の保全モデルからの脱却
  - 人の生活域と生きものの生息域の重なり合いを前提に、人と生きものの「望ましい」相互関係をまもることを重視した保全のあり方へ(→「何が望ましい」関係なのかを誰がどのように判断するのか)

    It would also be needed to shift management paradigm from conventional to new one which more focus on human-and-wildlife interrelationships formed in human-modified landscapes



おわりに

- 「景観の二極分化」➔保護地域の管理強化

- 比較的持続可能性が高い地域の森林利用の実態を明らかにした事例研究

  ➔ 「将来にわたってそうした利用が維持されていく保証はない」という理由で住民による
  ローカルガバナンスに対する否定的な反応

  - 村を取り巻く社会経済的変化への対応や土地利用に関する意思決定に影響を与える価値観などをふまえ、地域住民の将来の土地利用の志向性を明らかにすることも必要

    <c.f.> 沿岸部で広がるアブラヤシ農園への山地民の対応
  - **PES**などネオリベラル・コンサベーションをめぐる議論にどのように関わってゆくか

- 「開発」言説に対して
  - **森と比較的調和的な森林利用文化を維持することは誰にとって、どのような意味で望ましいのか？誰がそれをどのように判断するのか？**
  - 森や生きものとの共存の形はいろいろある→ どれを選ぶのか？

    <c.f.>Land sparing vs. Land sharing 論争 → **<土地を分かつ共存>** か**<土地を分かちあう共存>**？

開発主義と親和的?

地域の森林利用文化をまもる立場と親和的？

Thank you!

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