Report

Indigenous and local knowledge dialogue workshop for the first order draft of the IPBES thematic assessment of invasive alien species and their control

Online meeting, 29 September to 1 October

Suggested citation:

IPBES (2020): Andreve, J.L., Batzin Chojoj, R., Black A, Cleofe, J.T., Daguitan, F., Grant, C., Guillao, J.A., Jacobs, L., Malcolm, T., Mulenkei, L., Kumar Rai, K., Nzovu, A., Ole Kaunga, J.M., Regpala, M.E., Sall, N., Shulbaeva, P., Spencer, R., Timoti, P., Upun, Y. (eds.). Report of the ILK dialogue workshop on the first order draft of the IPBES assessment of invasive alien species. Online, 29 September to 1 October 2020.

Compiled by: Peter Bates, Patricia Howard, Tanara Renard-Truong and Peter Stoett

Disclaimer: The text in sections 3 and 4 represents an attempt to reflect solely the views and contributions of the participants in the dialogue. As such, it does not represent the views of IPBES or UNESCO or reflect upon their official positions.

Contents

1. Introduction

1.1. This report

This is the report on the indigenous and local knowledge dialogue workshop for the first order draft of the IPBES thematic assessment of invasive alien species and their control (the IAS assessment). Due to COVID-19, it was held online, from 29 September to 1 October 2020. The report aims to provide a written record of the dialogue workshop, which can be used by assessment authors to inform their work on the IAS assessment, and also by all dialogue participants who may wish to monitor, review and contribute to the work of the assessment moving forward.

The report is not intended to be comprehensive or give final resolution to the many interesting discussions and debates that took place during the workshop. Instead, it is intended as a written record of the discussions, and this conversation will continue to evolve over the coming months and years. For this reason, clear points of agreement are discussed, but also, if there were diverging views among participants, these are also presented for further attention and discussion.

The text in sections 3 and 4 represents an attempt to reflect solely the views and contributions of the participants in the dialogue. As such, it does not represent the views of IPBES or UNESCO or reflect upon their official positions.

The agenda and participants list for the dialogue are provided in annexes 1 and 3.

1.2. Context and objectives of the ILK dialogue workshop

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) launched the IAS assessment in 2019, and it will run until 2023. Participation of indigenous peoples and local communities (IPLCs) is crucial to this assessment, as many IPLCs have first-hand knowledge of the positive and negative impacts of invasive alien species (IAS) on ecosystems and people. Many IPLC groups also employ their knowledge of the environment to develop responses or management strategies for IAS. Many IPLCs are concerned that their knowledge, needs and views should be properly considered in both research and management of IAS.

The first order draft of the assessment was available for external review between 31 August 2020 and 18 October 2020. An online ILK dialogue was held from 29 September to 1 October.

The objective of the ILK dialogue workshop was to further dialogue between assessment authors and IPLCs, with the following aims:

- Provide comments and feedback on the first order draft of the assessment, in order to provide guidance to authors on how to further develop the assessment in relation to indigenous and local knowledge;

- Explore how indigenous peoples and local communities experience and understand invasive alien species;
- Explore how indigenous peoples and local communities respond to, adapt to and manage invasive alien species;
- Discuss how the invasive alien species assessment could be useful to indigenous peoples and local communities; and
- Identify resources and sources of information that could be included in the assessment.

This dialogue workshop continued the work of the first indigenous and local knowledge dialogue workshop for the assessment, which was held in November 2019 in Montreal, Canada.

The dialogue workshops are part of a series of activities for working with indigenous peoples and local communities and indigenous and local knowledge throughout the assessment process, in the context of the implementation of the IPBES approach to recognizing and working with indigenous and local knowledge adopted by the IPBES Plenary in decision IPBES-5/1, as explained in section 2.4 below.

1.3. The dialogue workshop and the external review process

The first external review is one of the most important phases in the IPBES assessment process. It allows scientists, decision makers, practitioners, indigenous peoples and local communities and other knowledge holders to provide feedback on the first order draft. The widest-possible participation and most diverse engagement in the first external review is vital to ensure the quality and policy relevance of the assessment.

One of the objectives of this dialogue workshop was to provide comments and feedback on the first order drafts of the assessment, in order to guide authors on how to further develop the assessment in relation to indigenous and local knowledge.

The first external review of the IAS assessment provided a unique opportunity to submit comments on the first order draft to the expert group. All comments had to be submitted in English, using the review template, following the external review process. More information on the review process is set out in section 2.4.5 below.

Key recommendations and other overarching comments on the first order draft made during the workshop were compiled in the assessment review template. Workshop participants were invited to review these comments by 17 October 2020, and following additional edits and no objections from participants, these were submitted to the IPBES secretariat on 18 October 2020.

2. Background

2.1. IPBES and ILK

IPBES is an independent intergovernmental body established to strengthen the science-policy interface for biodiversity and ecosystem services towards the conservation and sustainable use of biodiversity, long-term human well-being and sustainable development.

Since its inception in 2012, IPBES has recognized that indigenous peoples and local communities possess detailed knowledge on biodiversity and ecosystem trends. In its first work programme (2014-2018), IPBES built on this recognition through deliverable 1(c): *Procedures, approaches and participatory processes for working with indigenous and local knowledge systems.* As part of its work programme up to 2030 IPBES has objective 3(b) *Enhanced recognition of and work with indigenous and local knowledge systems*, which aims to further this work.

Recognizing the importance of indigenous and local knowledge to the conservation and sustainable use of ecosystems as a cross-cutting issue relevant to all of its activities, the IPBES Plenary established a task force on indigenous and local knowledge systems and agreed on terms of reference guiding its operations towards implementing this deliverable. IPBES work with IPLCs and on ILK has also been supported by a technical support unit (TSU) on indigenous and local knowledge, hosted by UNESCO.

Key activities and deliverables so far include:

- Progress in the development of approaches and methodologies for working with ILK was made during previous IPBES assessments (of Pollination, Pollinators and Food Production, Land Degradation and Restoration and four Regional Assessments and a Global Assessment of Biodiversity and Ecosystem Services);
- The development and implementation of the "approach to recognizing and working with ILK in IPBES", which was formally approved by the Plenary at its fifth session in 2017, and which sets out basic principles for IPBES's work with ILK;
- Development and implementation of methodological guidance for recognizing and working with ILK in IPBES, which aims to provide further detail and guidelines on how to work with ILK;
- Development and implementation of a "participatory mechanism", a series of activities and pathways to facilitate the participation of IPLCs in IPBES assessments and other activities;
- Organizing ILK dialogue workshops for the assessments, most recently for the assessments on sustainable use of wild species, values of nature, and IAS.

2.2. The IPBES assessment of invasive alien species and their control

The IAS assessment was initiated after the seventh session of the Plenary (IPBES 7, Paris, France, 2019) following a decision from the IPBES Plenary at its sixth session (IPBES 6, Medellin, Colombia, 2018).

The assessment is led by three co-chairs of the expert group preparing the assessment report, Aníbal Pauchard,[1] Helen Roy,[2] and Peter Stoett.[3] About 70 experts from more than 40 countries were carefully selected to encompass all regions and required expertise. They will be assessing the current status and trends of IAS and their impacts, taking into account diverse knowledge and value systems and providing policy-relevant options to promote effective IAS management and adaptation strategies. The assessment is supported by the technical support unit on invasive alien species (IAS TSU).

The objectives of the IAS assessment, as set out in the scoping document,[4] are to assess:

- The array of such species that affect biodiversity and ecosystem services;
- The extent of the threat posed by such species to various categories of biodiversity and ecosystem services, including impacts on agrobiodiversity and food, human health and livelihood security;
- The major pathways for and drivers of the introduction and spread of such species between and within countries;
- The global status of and trends in the impacts of such species and associated management interventions by region and subregion, taking into account various knowledge and value systems;
- The level of awareness on the extent of IAS establishment and their impacts; and
- The effectiveness of current international, national and subnational IAS management measures and associated policy options that could be employed to prevent, eradicate and control IAS.

Three cross-cutting themes in the IAS assessment are supported by liaison groups. They are:

- Indigenous and local knowledge
- Good quality of life
- Scenarios and models

Each liaison group is comprised of representatives from each chapter. The liaison groups' role is to ensure that their cross-cutting theme is well represented, in a consistent manner, throughout the assessment. The ILK liaison group is supported by the IPBES TSU on ILK.

[1] Laboratory of Biological Invasions (LIB), Faculty of Forestry, University of Concepcion, Concepcion, Chile; and Institute of de Ecology and Biodiversity (IEB), Santiago, Chile.
[2] UK Centre for Ecology & Hydrology, Wallingford, UK.
[3] Ontario Tech University, Oshawa, Canada.
[4] IPBES/6/INF/10.

Figure 1: Timeline of the IAS assessment

ILK Dialogue Workshops

2.3. Key indigenous and local knowledge questions to be addressed by the invasive alien species assessment

A series of questions was developed by the ILK liaison group and discussed during the assessment's first dialogue workshop. The questions aim to frame the work with ILK in the assessment. The aims of the questions are to ensure that each chapter addresses ILK and IPLC issues, and that the assessment has an overall narrative between chapters. The questions were sent out to participants in advance of the second dialogue workshop for their consideration. Further comments on the questions were also invited from participants. The questions are as follows:

Chapter 1: Conceptualization

a) From the perspective of IPLCs, is there a conception of an "invasive alien species"? Do IPLCs distinguish it from "native species"? How is this expressed?
b) Do IPLCs see some species as having any negative impact on their communities, lands or waters?
c) How do IPLCs obtain information about IAS? Examples of sources could include elders, on-country trips, hunting, fishing and gathering, continued cultural knowledge transfer, participation in citizen science initiatives, schools and education, reports from the younger generation, reports only from outsiders, or others.

Chapter 2: Trends

a) Are IAS increasing/decreasing in IPLC lands and waters?
b) Are IAS changing IPLC lands and waters, or their activities, laws and regulations, perceptions and beliefs, and/or cultural systems? If so, what changes have occurred or are occurring now?

Chapter 3: Drivers

a) What are main causes and drivers of IAS in IPLC lands and waters?
b) With IAS dynamics affected by many drivers (e.g., land use change, natural resource exploitation, climate change) do IPLCs recognise the main individual drivers of IAS, or are many drivers intertwined, and in what ways?

Chapter 4: Impacts

a) What are the impacts of IAS on IPLC communities, lands, waters?
b) Are there some IAS which IPLCs consider to have greater social and ecological impacts than others? How do they measure this impact? For example, the size of the area impacted, more people talking about it, the degree of common knowledge about IAS, their impact on certain activities including livelihood (hunting, fishing, agriculture), their impact on cultural traditions (specific totems/dreaming/law), involvement with studies, two-way knowledge.
c) When and under what conditions does the arrival of new IAS into the lives of IPLCs change their livelihoods and culture for the better or worse?
d) How and under what conditions do IPLCs incorporate and culturally adopt versus reject new IAS into their communities, in the context of their values or livelihoods?
e) Given all the other pressures on IPLCs (e.g., external population pressure, natural resource exploitation, climate change) and local ecology (e.g., land use changes, weather events, urbanization) are IPLCs able to identify the specific impacts of IAS on their community, or is it hard to discern between these and other impacts?
f) Are IAS making some of these other pressures more challenging?

Chapter 5: Prevention, management and adaptation

a) What are the situations in which IPLCs recognise the need to intervene in the context of managing or adapting to IAS?
b) How do IPLCs determine and implement approaches for responding to the impacts of IAS species on their communities, lands and waters?
c) How do IPLCs use their ILK in developing IAS management interventions?
d) What type of management programs do IPLCs think are most effective in their lands and waters, and in their own localities? Do they see any areas where one level of governance can help support the other, and how?

e) Do IPLCs want to collaborate with different knowledge systems to manage the issue of IAS and their impacts (for example two-way approach using ILK and science or other options), or do they want to manage the issue only within their communities?
f) What types of local cultural values do IPLCs use to manage IAS?

Chapter 6: Future options and policy

a) What future directions do IPLCs envision their communities taking with regard to IAS? For example, will IPLCs strive to mitigate the impacts of these species, to adapt to them, or to use them in harmony with other species?
b) How can these opportunities or channels to express the viewpoints of IPLCs be improved? How can IPLCs participation be better integrated with national policies?
c) Are international efforts relevant to IPLC needs and ambitions?

2.4. Modalities of participation for IPLCs in the assessment process

2.4.1. Introduction

In line with its approach to recognizing and working with indigenous and local knowledge, IPBES has worked to develop a series of activities and methodologies by which IPLCs can participate in IPBES assessments. These are outlined below.

2.4.2. IPLCs in the assessment expert group

IPBES assessments include indigenous and local knowledge experts, i.e. persons from indigenous peoples and local communities who have knowledge about indigenous and local knowledge and associated issues, and experts on indigenous and local knowledge, i.e. persons who have knowledge about indigenous and local knowledge and associated issues, who not necessarily members of indigenous peoples and local communities.

2.4.3. Contributing authors

IPLCs can also be invited to participate as contributing authors in support of an author of the assessment. This can include providing case studies that illustrate key issues or themes of an assessment, or working on portions of text, graphs or illustrations with assessment authors.

Contributing authors provide targeted support to an author, upon his or her request, focusing on a specific part of a chapter, or a specific table or figure. They will be listed as a contributing author only if their input is included in the final report.

2.4.4. Dialogue workshops

Dialogue workshops with IPLCs and assessment authors are a key activity for IPLCs participation. There will be at least three dialogue workshops during the assessment cycle, at key points in the process, as follows:

- The first dialogue, which discussed the early development of the assessment and key ILK questions for each chapter, was held on 15-16 November 2019 in Montreal, Canada;

- The second dialogue, the subject of this report, which was held 29 September to 1 October 2020, during the first external review period. The dialogue engaged IPLCs in reviewing the content of the draft of the assessment chapters, to assess strengths, gaps, and provide recommendations for additional sources of information;
- A third dialogue will occur during the second external review period and will engage IPLCs in critically reviewing the content of the draft chapters and summary for policymakers, to assess strengths, gaps, and provide recommendations for additional sources of information. This dialogue workshop will most likely take place in the first quarter of 2022, depending on when the review period for the second order drafts is set;
- Other dialogues may be arranged during the course of the assessment, including at national and regional levels, subject to the availability of resources.

2.4.5. Online reviews of drafts of the assessment

IPLCs can also engage in the two external reviews of drafts of assessments listed in the previous section. Drafts are made available on the IPBES website, usually for a six to eight week-period. The IPBES secretariat sends out a notification announcing the availability of the draft for review. Each comment submitted is specifically addressed by the IAS assessment author teams, and review comments and responses are posted online after the Plenary session that accepts the draft assessment report.

IPBES encourages collaboration among IPLCs or their organizations to create group consensus comments. As mentioned above, IPBES will hold dialogue workshops during both review periods to further facilitate IPLC participation in this process.

The first order drafts of the IAS assessment were available for review between 31 August 2020 and 18 October 2020.

The second order drafts will be available around the last quarter of 2021.

2.4.6. Call for contributions

An on-line call for contributions was launched for the IAS assessment on 12 June 2020 with a deadline of 15 September 2020. The aim was to provide a further avenue for IPLCs to provide information or case studies, and also to recommend networks, organizations or individuals who could become involved in the IAS assessment process. Contributions included community reports, academic papers, case studies, videos, songs and artwork. The call was made available in English, Spanish, French, Russian and Arabic.

2.4.7. Regular communications

The ILK and IAS TSUs aim to maintain good communications with dialogue participants about the development of the assessment and opportunities for participation and further development of case studies and reporting from the meeting.

IPBES also aims to pay special attention to IPLCs when working on outreach and information sharing, especially once the assessment is finished.

2.5. Benefits to IPLCs of participating in the assessment

During previous workshops, participants noted that if IPLCs are to participate in the assessment process there should be clear benefits for them. Key benefits discussed included:

- The opportunity for IPLCs to share experiences with other IPLCs around the world about IAS impacts and management strategies;
- The opportunity for IPLCs to share and exchange experience and knowledge around IAS with scientists;
- Use of the final assessment as a tool when IPLCs are working with policymakers, decision-makers and scientists, noting that part of the planning for the final assessment includes the development of an accessible summary for IPLC; and
- The opportunity to bring ILK on IAS to the attention of policymakers and decision-makers, and to consequently increase action on IAS in ways that IPLCs see as appropriate.

2.6. FPIC

Free, prior and informed consent principles are central to IPBES work with indigenous peoples and local communities, and a series of ethical principles and have been developed to ensure that FPIC is followed in IPBES activities. These principles were agreed upon by the participants of the dialogue, and will be followed by both indigenous participants and assessment authors. The full agreed-upon text and the names of those agreeing to these principles are provided in annexes 2 and 3 to this report.

3. Key recommendations and learning from the dialogue[5]

Over the course of the workshop, IPLC participants made a series of comments and recommendations for the first order draft of the assessment, for the consideration of assessment authors. The section below sets out the comments provided by the participants.

Chapter 1 – Introduction

Invasive alien species are a serious issue for many IPLCs, with impacts on environment, food security, culture, spirituality, language, knowledge transmission, livelihoods, health, well-being and economies.

Often, IPLCs do not immediately consider a new species to be bad. Communities will often watch a species to see how it interacts with the environment, other species and their food security, livelihoods and culture before deciding it if is positive or negative.

IPLCs can consider species such as introduced palm oil trees in plantations to be invasive alien species, as they are new to the environment, they are increasing in abundance, and they are associated with habitat loss and other problems. However, as they are growing in plantations, the IPBES assessment may not consider them as IAS. These different perspectives on IAS could however be discussed, and it was noted that such land use changes can also facilitate new biological invasions in the same area.

In many cases, IPLCs consider humans to be an invasive alien species that causes damage to the environment. The concept of humans as IAS does not fall within the scope of the assessment, but participants recommended that these IPLC perspectives be discussed in the assessment.

Chapter 2 – Status and trends

Chapter 2 on status and trends contains text in section 2.2 on indigenous peoples' cultural values and spiritual relationships with wetlands. It was recommended that this should be extended to all environments, including coastal and marine, which include very culturally important places.

[5] Disclaimer: The text in section 3 represents an attempt to reflect solely the views and contributions of the participants in the dialogue. As such, it does not represent the views of IPBES or UNESCO or reflect upon their official positions.

Chapter 3 – Drivers

Drivers are not segmented or dichotomised, with few clear linear paths of cause and effect; rather, constant dynamic change is happening on the ground. The assessment could recognise this complexity.

Participants suggested that governments and government policy could be seen as direct drivers, as they can directly lead to the introduction of alien species.

Chapter 4 – Impacts

Impacts come from a complex web of interactions between environmental and social processes, including community adaptation and government regulations which can constrain adaptation. The assessment could recognize and discuss this complexity.

The chapter could consider if IAS are changing the relationship of IPLCs and nature in sacred landscapes.

Chapter 5 – Management

Community members, for example hunters, fishers, herders and gatherers, are often the first to see new species in their environment, and they will continue to monitor their spread and impacts.

Communities often have the capacity to adapt to invasive alien species or play a strong role in their management, as they often live and work in close contact with their local environment. For example, local fishers can support management of invasive marine species, through their knowledge of the environment and their daily interactions with marine species.

When a species is new to an environment, communities may not initially have the knowledge to manage or adapt to it. Observation and experimentation is needed to learn what to do. Collaborations and knowledge sharing between communities can be important to help develop knowledge and strategies between localities and regions. Collaborations with scientists and other researchers can also be helpful, as long as this is done on equal terms with respect for ILK.

In the view of many participants, government regulations often limit the ability of IPLCs to adapt to and manage IAS, as they can impede flexible approaches and experimentation in the face of new problems.

Management strategies can also have unforeseen impacts. These can also often be undocumented, as realties on the ground can be complicated and different from official accounts. Underlying environmental, social, cultural and governance interactions need to be examined.

It is important to articulate and highlight spiritual methods for managing invasive alien species, including prayers, ceremonies and other ways of maintaining balance in the relationships between humans and nature.

Communication and transparency are key issues when planning for management interventions for invasive alien species, so that information can be shared between governments, scientists, NGOs and IPLCs. Potential negative and positive impacts need to be clearly explained and discussed between parties.

Communication and transparency are also key during management interventions, so all sides can see how approaches are functioning on the ground, and unforeseen negative impacts can be addressed.

Participatory mechanisms for managing IAS with IPLCs need to explore broad collaboration, taking into account the self-determination of indigenous peoples, Free, Prior and Informed Consent, land rights and meaningful participation of women and youth at all levels, before any kinds of intervention to control IAS in IPLC lands, waters or territories.

Many articles, reports and papers are not written by IPLCs, and instead are often written by researchers, NGOs and governments from outside of the community. They may therefore not capture realities on the ground. This can especially be the case when they describe co-management efforts, which can be portrayed as highly successful, even when communities find that power imbalances and other serious issues are present. Authors should be aware of this potential source of bias in the literature.

Chapter 6 – Future options

Many IPLCs are happy to coordinate, participate and collaborate to provide the knowledge, management and governance needed to understand, monitor and manage IAS. However, this collaboration should also enhance and support IPLC knowledge systems and other concerns, as discussed in the following comments that could be addressed in Chapter 6.

Building bridges between local-level realties and national-level policy processes is a key concern for many IPLCs.

In addition to a focus on national and international governance, it is important to include discussions of the key role of customary protocols, governance and institutions, emphasizing indigenous peoples' self-determination and rights to manage lands and resources. Working with and enhancing support for traditional governance systems could be a key goal of efforts to manage IAS, including through policy, regulations, tools, methods and approaches.

IPLCs want to assume an active role in defining issues around IAS, and in defining, developing and implementing management strategies and policies. The full and effective engagement of indigenous peoples, local communities, women and youth should be ensured at all levels of decision-making processes.

It is important to discuss human rights and self-determination of IPLCs, including around efforts to control and manage IAS using IPLCs' own governance systems and traditional ways of life. It will be important to highlight that recognition of the rights of indigenous peoples and also local

communities, including land rights, has a direct impact on how IPLCs can adapt to and manage IAS.

It is important to recognise and highlight diversity of indigenous knowledge systems, including indigenous sciences, technologies, skills and information systems, navigation and indigeneity, customs, norms, behaviors, traditions, occupations, food and farming systems.

Efforts to build policy and management systems around IAS should include attention to IPLC values including linguistic, cultural, religious, aesthetic, moral, ethical and spiritual values. The concept of 'indigeneity' may be important to understand and elaborate in terms of decisions on the future by IPLC.

ILK and customary governance and management are under threat in many communities. Efforts to understand and manage IAS through ILK could also have preservation, support to and revitalization of ILK transmission and customary governance as additional goals.

Government processes and regulations can be very complex and it is time consuming to engage with them. IPLCs may need support in order to do this successfully. Partnerships with researchers, lawyers, NGOs and others may also be needed. There needs to be further deep discussion on IPLC co-governance, co-management, and other systems for IAS. IPLCs need further internal discussions and sharing on this.

Indigenous peoples are developing their own case studies and examples of adapting to and managing IAS, in order to show the international and national governance systems that they have knowledge, skills, experience and capacity to share.

4. Case studies[6]

During the workshop, participants provided many examples of how IPLCs are experiencing and managing IAS. These examples are discussed below in alphabetical order by country. This information could provide a basis for further development of case studies for the assessment. The section below sets out the case studies provided by the participants.

4.1. Giant African Snail, Antigua

Ruth Spencer

Trends

The giant African snail (*Achatina fulica*) was first reported in Antigua in March 2008, and is now found across the island (but it is not present in Barbuda).

Impacts

The snails are a big threat to agriculture as they eat the plants. They can also be harmful to human health.

Management

Community members, especially women, have many observations about the snails and other IAS, and these are reported to the government.

Local people have often resorted to hand picking the snails and burning them. They have also tried using salt.

Other control measures include planting plants of the mint family (e.g. rosemary, thyme, spearmint, peppermint) as these repel the snail. Chickens and ducks can be released to eat the young snails. Chemicals can be used where necessary.

4.2. Pond apple (custard apple), Australia

Chrissy Grant

Trends and drivers

The pond apple (*Annona glabra*) is an invasive plant that is listed as a Weed of National Significance in Australia. It originated in America and West Africa and was introduced to Australia in about 1912. It is found along the eastern Queensland coast, and has now also moved down

[6] Disclaimer: The text in section 4 represents an attempt to reflect solely the views and contributions of the participants in the dialogue. As such, it does not represent the views of IPBES or UNESCO or reflect upon their official positions.

the western side of Cape York and is moving across to the Northern Territories. Climate change may be helping the pond apple to move south.

Impacts
The pond apple behaves like a mangrove, thriving in brackish and fresh water, and produces dense growth which crowds out native vegetation.

It has an effect on access to traditional areas, including access to the mangroves where communities would gather crabs and other foods. Men's cultural sites are found along the coast, while women's sites are inland along the creeks, and pond apple can reduce access to some of these sites. It can take over an area completely, not only restricting access but making it difficult for traditional food sources to thrive.

Management
In Queensland, the Eastern Kuku Yalanji are the traditional owners of the land and waters. Rangers, elders and community members manage their lands within an Indigenous Protected Area (IPA). This is part of the Wet Tropics World Heritage Area with the Great Barrier Reef World Heritage Area abutting the coastline. This is an area of coastline between the Daintree River and the Annan River, containing many estuaries, and includes land and also the sea (even though the latter has not yet been fully recognized under the IPA, but is recognised under the Native Title Act). They manage more than 20,000 hectares of land, either solely or in collaboration with the local and national government.

The Eastern Kuku Yalanji realised that pond apple poses a threat to their native biodiversity and to indigenous cultural sites located along the IPA.

Pond apple is very vigorous and hard to eradicate. Communities are working with the local government, providing training for rangers on different methods for control. Methods include cutting the trees down and spraying. Both must be done with care. If bark falls on the ground the tree can regrow, and they burn the wood once it is cut. Spraying with poisons also has to be done under careful guidance from experts. Many smaller pond apple infestations are now under control, but the rangers work is focused on being able to remove the pond apple from the IPA. The work continues, and never stops. The pond apple can be cut down in an area and they will shoot up again the year after.

The pond apple does not bear fruit, and local communities have not found a use for it. It is so vigorous that using it would risk spreading it.

Funding was found to support the rangers to do this work. This allows rangers to get back onto country. A junior rangers programme has recently been established, and they have trips to teach the junior rangers what to look for, how to recognise pests and feral species, how to avoid spreading them, and how to report this to senior rangers at the headquarters.

4.3. Rats, deer, Australia (Torres Strait)

Melanie Dulfer-Hyams

Background

Torres Strait is in the far north of Australia, with 300 islands, 17 of which are inhabited. It is the traditional estate of Torres Strait Islanders, and most have exclusive possession through native title rights.

Status and trends

There are a lot of IAS across the region, including rats and deer.

Management

Torres Strait Regional Authority is a government agency that provides regional coordination of policies and programmes. It is a unique agency in that elected traditional representatives help govern the agency. There is a Land and Sea Management Unit that works as a natural resource management body; within this, there are different teams working in different areas, including 50 indigenous rangers making up 13 ranger groups that provide land and sea management across the Torres Strait.

Because the government agency works with landowners, all of the projects are owner led, and the regional authority spends a lot of time on consultation and informed decision-making in every phase of planning.

All of the IAS management projects that are implemented with traditional owners are established because there are landowner concerns, interests and identified priorities about those IAS. The agency provides information on management approaches, methods, and risks involved. They present a certain methodology and alternative options, and work with experts on feasible approaches. Cultural values are assessed against scientific approaches. If owners think too much risk is involved, they make the ultimate decisions about project continuation.

The agency is working on a rat eradication programme for one of the uninhabited islands that is highly culturally significant. They have already spent more than a year informing traditional owners about how this could potentially work, and discussing methodologies and establishing decision-making and other protocols – every step needs to have traditional owners at the forefront. They already started to work on baseline monitoring, which is implemented by rangers, and includes the collection of information on ILK and cultural values, a lot of which will be used for future potential eradication.

Eradication is addressed on a case-by-case basis for each species. It is very contextual, in a region of islands and many cultural groups. Every location can have a different cultural, natural or landscape context. Values are also different across generations, for example around deer, which some people would not refer to as IAS as they are an important source of food. Most of the debate is around the right to eradicate a species that has as much right to exist as any other. However, pragmatism usually wins out for invasive species that provide no benefits i.e. are not a

source of food, or do not provide an ecosystem service in place of a lost native species, and especially if the pest is threatening the survival of already threatened native species. Usually in these cases there is an agreement to manage the species.

4.4. Emerald Ash Borer, Canada

Lynn Jacobs

Trends

The emerald ash borer (*Agrilus planipennis*) was native to Asia. It has been a problem around the Mohawk community of Kahnawà:ke in Quebec, Canada for the last five to 10 years. The primary users of the ash trees (basket makers) and the community's Environment Protection Office were the first to notice the impacts.

Drivers

The insect spreads from movement of wood containing their larvae, and also from adults flying from tree to tree and laying eggs under the bark, where the larvae develop. This can then kill the tree.

Impacts

Once infected by the emerald ash borer, the ash tree has a 99-100% chance of dying in the next three to five years. More than 100,000 ash trees are predicted to disappear in the community. The infestation is currently at its peak.

The community has white ash, red (or green) ash, and black ash. The white and red ash are used for handles for baskets and lacrosse sticks. The black ash is of particular significance for the community because it can be pounded and split along its annual growth rings to form splints that are used for basket-making.

With the loss of trees, there is a loss of basket making materials and concern that knowledge will also be lost (i.e. how to harvest, pound and prepare for basket making, weaving, etc.), as well as the knowledge of where the trees are found, their ecosystems, and the language around these cultural practices.

Everyone is seeing the impacts. The community has many ash-dominant forests and the ash trees are everywhere in the community. In the village area, most people have ash trees in their yards. Also in the forest environment, when they go out to harvest medicines, other foods, or to hunt, they are seeing the loss of the trees and the impacts on the forests. So the emerald ash borer is not only affecting basket makers, it is also affecting people on a more personal level.

Woodpeckers have been increasing. At first the community thought this was a positive thing. However, it is actually a sign that there are ash borers in the trees, as the woodpeckers eat them. Woodpecker damage is a sign of tree decline.

Management

There is not much that can be done to slow the spread of the emerald ash borer, as the insect flies from tree to tree, so the focus is on managing impacts and trying to preserve knowledge and some ash trees for the future.

They are approaching the problem by using the knowledge and perspectives of the community, as well as working with scientists.

Strategies include awareness raising, and they have produced educational materials to help the community understand and respond to the emerald ash borer. This includes how to recognise an infected tree and monitor the spread of impacts.

The community is also working with landowners with the aim of harvesting infected black ash, so that materials for basket-makers can be stored for the future.

The community also treats some ash trees with TreeAzin to save them. This is expensive and cannot be done for many trees, but the aim is to preserve some trees (mostly black ash) for posterity, so that youth can learn from elders what the black ash looks like in its natural environment.

They are also working on saving seeds, especially from black ash but also from white and red ash, working with the National Tree Seed Centre to store their seed collection, so that the trees could be replanted in the future.

The community is also replanting other species, for habitat purposes, to minimise impacts from ash decline on other species, including species that the community gather for food and medicine.

The community is also engaging with basket-makers and the cultural centre around educational programmes about basket-making to preserve this knowledge.

The community is also working with academics to try to assess, understand and control this IAS. Due to the work the community has been doing, they were recently contacted by researchers from the US-Canada Ash Protection Initiative, a cross border programme. They are trying to find resilient ash trees, so that these can be propagated. The community is now working with them to potentially host test plots for replanting ash trees that are resistant to the emerald ash borer. This is a US-Canada initiative which is in the process of seeking funding. Community members are not directly involved in this aspect; they were contacted because of their work, so the team has been consulting with the community in terms of project development and how they would like to be involved. There has been good collaboration so far, and prior to developing the proposal the community were given the opportunity to provide feedback on their future involvement. This could be a good example of cross-border collaboration with multiple stakeholders for Chapter 6.

Recently, the black ash tree was classified as threatened by COSEWIC (Committee on the Status of Endangered Wildlife in Canada), and it is being considered for protection under the Canadian Species at Risk Act. These changes could impact on the rights and interests of communities who

are trying to protect the black ash, and also wanting to harvest black ash for traditional use. Impacts could be positive in that more ash may be protected, or negative if there are restrictions on harvests.

In terms of cultural management methods that include spirituality, the community does not approach this from a species-by-species perspective. Spirituality is approached more holistically, following the seasons, acknowledging all the species that fulfil their responsibilities, and acknowledging human responsibilities. From a cultural perspective, the responsibility of human beings is to ensure that the cycles of life of all beings continue, including the ash trees.

4.5. Phragmites, Canada

Lynn Jacobs

Trends and Drivers

The Mohawk community of Kahnawà:ke is located in a rural area near Montreal. There is agricultural development and residential development nearby. Soil being moved into the community is a big cause of invasive plants reaching their community. Movement of affected soil within the community is also increasing the spread. Phragmites *(Phragmites australis)* is a particular problem.

Impacts

Phragmites can cause significant damage on riverbanks and wetlands. It can impede access to wetlands for gathering food and medicine, and it causes habitat change.

The community also has a territory one and a half hours drive to the north which is relatively untouched where they can still hunt and fish, but impacts near the community are great.

Management

The community would like to quantify, map and develop a comprehensive plan on how to manage phragmites and other plant IAS.

The community has an ideological dilemma, because there are calls to control this plant using herbicides from outside of the community, but for the community this is a risk to medicines and foods.

Other communities use phragmites to make paper, and the community is discussing whether they could also do that.

4.6. Sargassum and American iguana, Fiji

Alifereti Tawake

Conceptualisation

The concept of "country" is very important in the Pacific region, as it is in Australia. In Fiji there is the concept of *balua,* of social and ecological linkages, where people are very much at the centre of these interfaces. The belief system is part of the social connections to nature. This concept, along with traditional knowledge and customary rights, is very important. In the Pacific most of the values and knowledge are place-based for many species, including species now termed as "invasive".

Trends, drivers and impacts

In the Pacific, on the coast, sargassum seaweed (*Sargassum muticum*) is a growing issue. There are also some introduced species, for example in Fiji the American iguana was introduced as a pet but is now taking over an island, feeding on fish and other species.

Management

There is often little ILK for some of these IAS, as they are too new. There is almost no literature on their impacts or trends. In these cases, science is probably needed to support management. This is an ongoing tension often identified by IPLCs: "which knowledge is more useful or should be used more?"

4.7. African palm and snakes, Guatemala

Ramiro Batzin / Yeshing Upun

Trends and Drivers

African palm (*Elaeis guineensis*) was introduced to the ecosystem for economic purposes in plantations, and these are expanding. Snakes were also introduced to protect the palms from rats.

Impacts

African palm plantations have a major impact on the ecosystem through habitat loss, pesticides and pollution. Related problems include worker rights issues. These have highly negative impacts on the livelihoods and rights of the local indigenous communities.

Some of the snakes that were introduced are poisonous and they bite local people. The local people have ILK about snake bites from native species, but they do not know how to treat bites from the new snakes. This has caused people to relocate away from the areas around the plantations.

Management
Indigenous communities are reviewing a document to elaborate guidelines and safeguards for palm plantations. The policy of the state is to support the palm plantations.

Discussion
Indigenous peoples see the palms as invasive because they are taking over huge areas of land. However, if they are not spreading beyond the plantations, they would not necessarily be considered to be 'invasive' by the IPBES assessment. However, these indigenous perspectives could be discussed in the assessment, recognizing that the scientific definition of invasive alien species is not the only way of looking at this issue. It was also noted that in this case, and in many cases, humans could be considered to be the invasive species, as they are the ones who have entered the ecosystem and begun to cause damage. This perspective could also be discussed in the assessment when considering IPLC perspectives of IAS. Although it does not fall within the scoping document that sets out the goals and boundaries of the assessment, the assessment could still seek to explore multiple values and perspectives.

4.8. Invasive species including the plant pathogens phytophthora and myrtle rust, New Zealand

Amanda Black / Thomas Malcolm

Conceptualisation (Thomas Malcolm)
Maori communities see multiple values in their ecosystems (including as food sources or for spirituality). Anything that is new and has negative impacts on these values are considered as pests. Maori values can change with time. Younger generations are often not following the "old ways" of traditional medicine. For example, younger people may like invasive deer as these provide food, even though they can negatively impact traditional medicine.

Trends and Drivers (Amanda Black)
New Zealand's culturally iconic, ancient native kauri (*Agathis australis*) forests are threatened with extinction as a result of dieback caused by an invasive and highly virulent soil-borne pathogen (*Phytophthora agathidicida*) (Waipara et al. 2009; Beever et al. 2009). Kauri trees function as a foundation species in their forests, supporting an ecologically distinct plant and soil environment.

Myrtle rust (*Austropuccinia psidii*) is also a plant pathogen. Myrtle Rust was confirmed in New Zealand in March 2017, and by January 2018 had been found at over 200 locations across the North Island, affecting four indigenous genera.

Impacts
The impacts of disease outbreak, and subsequent tree dieback on kauri forest ecosystems, remains unknown.

Māori are at risk of losing their cultural identity through lost socio-ecological links as species such as kauri and members of the myrtle *myrtaceae* family are pushed towards extinction (Nuttall, Ngakuru and Marsden, 2010).

Kauri are an iconic and culturally significant tree species for New Zealand, being regarded by the indigenous Māori as their living ancestors (Black et al. 2018). Kauri function as foundation species in their namesake forests, significantly influencing surrounding plant species composition and supporting the most species rich forest type in New Zealand (Wyse et al. 2014; Ogden, 1995). In addition, kauri have a huge presence in their forests, reaching heights of up to 60 m, diameters of up to 5 m and ages of up to 2000 years (Steward and Beveridge, 2010).

New Zealand's native Myrtles are fundamental to Māori culture and identity and are considered taonga (treasured entities). Ancient myrtle trees, such as 600-year-old Te Waha O Rerekohu, are revered as sacred ancestral beings, whose direct descendants serve as their contemporary guardians. Serving a range of ecological functions (from keystone forest trees to adaptable pioneer species colonizing lava flows) this plant family also includes the pollen source of Mānuka honey (*Leptospermum scoparium)* and exotic fruit (feijoa; *Acca sellowiana*) and timber crops (*Eucalyptus*) providing income for rural families.

Communities can lose these resources and also language and knowledge associated with species. IAS therefore have impacts on the environment but also on culture, values and knowledge systems.

Management
Conservation land continues to be managed and owned by indigenous communities, and often has been for millennia. In the case of New Zealand Māori, they are the second biggest landowners after the New Zealand government (Lambert et al., 2018)

Communities want to develop their own methods to control IAS. It is important for Māori to define their own priorities, as the government would often prioritise plants that are important for economic reasons, while Māori communities might focus more on culturally and spiritually important plants. There are elders who do not want spiritual issues to be discussed and quantified, and others who do want it quantified. In relation to efforts to assess impacts from IAS, Māori researchers are trying to include impacts on the Maori life-force, which has three dimensions: Māori worldview, Māori knowledge and Māori way of doing things. This encompasses spiritual and cultural impacts. This gives importance to plants that do not have economic value, which would otherwise not be considered as important. It is a difficult balance, as the system is still weighted towards economic concerns and the dominant Euro-descendent culture.

ILK systems need to be included in the scoping of the problem and development of the solutions. Government agencies have timelines and deadlines and sometimes they want a quick solution. ILK systems can therefore provide useful perspectives to protect the lands as they may have a more long-term perspective, as Māori have been in New Zealand for hundreds of years.

Indigenous researchers affiliated with the Bio-protection Research Centre (Bioprotection Aotearoa after June 2021) and Te Tira Whakamātaki (Māori Biosecurity network) are working with communities to understand how to manage Kauri die back. This work helps to support communities to make decisions, lobby for funding, communicate with governments, and participate on technical advisory groups. The aim is to empower communities to define and manage their own issues rather than doing it for them. Another aim is to co-create programmes, which can be sustainable without outside influence, and which build capacity for education in ways that the community wants. Communities do management using their own knowledge, and Bio-protection Research Centre provides molecular support when needed. Te Tira Whakamātaki have also held regional meetings, and they train local Māori to work with seed banks for plants that are special to them.

Co-governance is often not working well for communities as in general the government controls funding, and therefore has more power and often makes the decisions.

Senior Māori scientists working in the area of plant protection are trying to develop a sustainable cohort of indigenous researchers. They are ring-fencing resources, recruiting young researchers, and engaging with schools with children from 5 or 6 years old and onwards. This is a journey taken through communities where these students come from. At undergraduate and postgraduate level there are scholarships and internships. There is a strong governmental educational policy encouraging use of ILK and research in university, which is not perfect but it gives a platform. There is also a growing critical mass of Māori researchers in the system that have started to influence and provide a culturally safe environment where young students can be protected from discrimination against ILK. Increasingly non-Māori are also more supportive and are providing support and space for ILK research to happen alongside mainstream research. Elders also provide cultural support. Another important task is linking communities and researchers and networks across New Zealand and the Pacific.

Resources/references

R.E. Beever, N.W. Waipara, T.D. Ramsfield, M.A. Dick, I.J. Horner. 2009. Kauri (*Agathis australis*) under threat from Phytophthora. *Phytophthoras in Forests and Natural Ecosystems*, 74 (2009), pp. 74-85.

A. Black, N. Waipara, M. Gerth. 2018. Calling time on New Zealand's oldest tree species. *Nature*, 561 (2018), pp. 177-178.

S.J. Lambert, N. Waipara, A. Black. 2018. Indigenous Biosecurity: Māori Responses to Kauri Dieback and Myrtle Rust in Aotearoa New Zealand In: *The Human Dimensions of Forest and Tree Health.* pp.109-137. DOI: 10.1007/978-3-319-76956-1_5

Nuttall, P., Ngakuru W., & Marsden, M. (2010). *Te Roroa effects assessment for Kauri Dieback disease* (*Phytophthora* taxon Agathis—PTA). Report prepared for Te Roroa and the Kauri Dieback Joint Agency Response by Wakawhenua.

J. Ogden. 1995. The long-term conservation of forest diversity in New Zealand. *Pacific Conservation Biology*, 2, pp. 77-90.

G.A. Steward G.A. and A.E. Beveridge. 2010. A review of New Zealand kauri (Agathis australis): its ecology, history, growth and potential for management for timber. *New Zealand Journal of Forestry Science,* 40, pp. 33-59

N. Waipara, J. Craw, A. Davis, J. Meys, B. Sheeran, A. Peart, et al. 2009. Management of kauri dieback. *New Zealand Plant Protection*, 62 (2009), p. 407.

S.V. Wyse, B.R. Burns, S.D. Wright. 2014. Distinctive vegetation communities are associated with the long-lived conifer *Agathis australis* (New Zealand kauri, *Araucariaceae*) in New Zealand rainforests. *Austral Ecology*, 39, pp. 388-400.

4.9. Lionfish, Panama

Jorge Andreve

Conceptualization

In the Guna indigenous languages the fish does not have yet a name, but today communities want to fight against this fish due to the damage it does to biodiversity and livelihoods.

Trends

The lionfish (*Pterois volitans*) was first observed in in the Biscayne Bay of Florida in 1992. It 'officially' arrived in Panama in 2009, according to scientists. However, indigenous peoples from Panama saw the arrival of the fish in 2008.

Communities have also seen a change in lionfish behavior. In other regions lionfish occupies deep areas but in indigenous peoples' areas they are found also in the shallows.

Impacts

They did not see any impacts in 2008 but over 2017 and 2018 there were changes in the reef ecosystems and fishing zones for lobsters (*langostas espinosas)*. The fish and lobsters that communities used to eat are now eaten by lionfish. Now, where they used to find lobsters, they find the lionfish. The lionfish has therefore affected the food security and livelihoods of the indigenous peoples, because Gunas obtain protein from fishing on the reefs.

Management

At first, the community did not try to manage the lionfish because they did not know it, and it was not having an impact. Now they want to manage the problem.

The organisation *Fundación para la promoción del conocimiento indígena* started a study. The methodology was to look at data that was already published, and also to carry out fieldwork and awareness-raising, and to work with communities to do a participatory mapping to analyze the issue and see the distributions and impacts of the lionfish. They now have some results from

these activities, but a deeper analysis of culture, food systems and economy is needed. The study was only in one community, in one island out of 49, so it was very small scale. Yet it showed a very large impact from the lionfish.

The government often does not take the community's ILK into account to combat the problem. For example, they tell the communities that they should eat the fish to reduce its numbers, but the Guna cannot integrate it into their food consumption because it is "not from here", so people do not want to eat it. Other people have been hurt when trying to fish it. At present the organisation does not get much support, and they are working by themselves on the issues. They have met with government agencies to try to build collaboration.

The organization wants to find support and build co-management. In terms of control, work could be done with lobster fishers, because they are the ones who are at sea. If the Guna can capture and sell lionfish it may help to rescue the economy of the community. At present they only have sales of lobsters and octopus, but there is no market for lionfish. Therefore, the control being done at present is minimal and lobster fishers only kill the lionfish when they find them by chance. Also, scuba fishing it not allowed in the area, as part of customary protection measures. This has led to high biodiversity in their waters, with more than 80% of species found in the Caribbean in their area. The Guna have conserved this diversity and related spirituality. But these rules make finding and killing the lionfish more difficult.

4.10. Golden apple snail, Philippines

Florence Daguitan

(Information came from interviews and personal observations in the 1990s while Florence was working in some remote areas of the Cordillera Philippines, mostly in her hometown, Sagada, a mountain province. References with more information are also provided.)

Trends

The golden apple snail (*Pomacea canaliculate*) was introduced in the Philippines in the 1980s (FAO, 1998).[i]

Drivers

The snail was introduced by the Department of Agriculture to increase sources of protein for the Filipinos. These snails were supposed to stay in contained environments, but they were able to go to the ricelands.

"*With only a few natural enemies to constrain them, the snails rapidly developed into a serious pest in many areas of cultivated rice land in Asia. Their fast growth and reproduction - females lay egg masses of up to 500 eggs once a week - leads to population levels that can destroy entire rice crops*."[ii]

Also, the snails *are able to bury themselves in the mud and hibernate for up to six months. When water is re-applied to fields, snails may emerge.*[iii]

Impacts
The snails eat the young leaves and stem of the newly transplanted rice seedlings and these have to be re-planted.

While farmers increased their investments on seeds there was more than 50% decrease in yield of the rice.

There has been a disappearance of about six species of edible snails, the mudfish and one edible weed in the ricelands. This led to a loss of sources of protein, vitamins and minerals and for some income from the mudfish. The six species of snails were not used in rituals, but it was a loss of the diversity of food sources available. People believe that the golden snails eat the eggs of these snails and fish.

There are also other introduced species which may be impacting these species, for example there are now many invasive fish with wide mouths – the disappearance of these other species started from the increase in these fish, but when the snails arrived it became much more serious. Other changes in the environment in the ricelands are coming from climate change. Many needle-like worms have appeared, so many that they can cause seepage of the rice paddy so that the irrigation systems fail. This is attributed to change in climate.

Management
In Tabuk, the rice bowl of the Cordillera Region, people resorted to the use of pesticides to control the golden snail and experienced the adverse effects of these chemicals (e.g. skin disorders, peeling of nails in the feet and hands, swellings, blindness).

In remote areas manual picking was the common practice of control. People also learned how to do water management to help control the snail. Ducks can also be brought in, which eat the snails.

People mostly learnt to manage the snails through experimentation and sharing of knowledge learned within the communities. From time to time when they do rituals and gatherings they exchange knowledge, and these discoveries are shared. Later, some of the NGOs also systematized community knowledge on water management and included it in their training modules.

The people eventually adapted to the taste and included the snail into their diet. This was one major motivation to collect, and therefore control, the snail. By the 21st century, the snail was seen as beneficial as it now serves as food and women need not weed the rice fields as weeds are being eaten by the snail. People also began to forget about the species that had disappeared.

However, the snail is a major obstacle in the promotion of systems rice intensification (SRI) which was proven to increase rice yield by 3 to 5 times. One fundamental principle of the SRI is to plant young seedlings of 18 to 22 days and these are very vulnerable to the golden apple snail.

Extra resources / references

[i] FAO, 1998, The golden apples in the ricefields of Asia. News Highlight. April 30, 1998
[ii] *Ibid*
[iii] Rice Knowledge Bank. Golden apple snail. http://www.knowledgebank.irri.org/step-by-step-production/growth/pests-and-diseases/golden-apple-snails
[iv] Halwart, Mattthias. The golden apple snail Pomacea canaliculata in Asian rice farming systems: Present impact and future threat April 1994, International Journal of Pest Management 40(2):199-206 DOI: 10.1080/09670879409371882

4.11. Concepts and management, Philippines

Florence Daguitan, Jo Anne Guillao and Maria Elena Regpala,

Conceptualisation

Modernization has resulted in a disconnection with nature, which has brought about an insensitivity and inability to read the signs and messages from nature and the unseen. It is from this viewpoint that the indigenous beliefs in the unseen are often labelled as superstitious. The unseen are ever-present for many indigenous peoples in the Philippines and indigenous peoples read the signs and messages from nature and the unseen. People constantly invoke the unseen spirits as they go about their daily tasks in securing their livelihood from the land. When working near a spring, or cutting branches from a tree, people first ask permission and goodwill from the spirits. Unseen spiritual beings include God, ancestral spirits, nature spirits, souls of living people and other spirits (Source: 2015, Judy Carino-Fangloy, Merci Dulawan, Vicky Macay, Maria Elena Regpala and Lucy Ruiz. Indigenous Earth Wisdom: A documentation of the cosmologies of the indigenous peoples of the Cordillera. Baguio City: Maryknoll Ecological Sanctuary, pp. 27-28).

Impacts

Among many IPLCs, the role of IAS in human life is known because of IPLCs' close inter-action with nature. In some parts of Cordillera, Philippines, the disappearance of species that are part of the food system or diet of communities; the decreased yield of food crops and animals; or the added work that they have to do to manage/control IAS are perceived to directly relate to the life and health of the people. It is viewed to effect life because indigenous peoples have established relations to nature. People easily connect invasion of their environment as an invasion of their lives.

Among the Teduray and Lambangian people of Mindanao, Philippines, their perspective is "our land and nature is the extension of our body and life or *refa lowo".* Therefore, impacts on nature have direct effect on nature's contributions to people (NCP) and good quality of life. Peoples' contributions to nature (PCN) should also be included. For example, rice fields are manmade. While rice fields are intended as production sites, they also become habitats of many species through time, e.g. insects, snails, fish, frogs. When these were attacked by the IAS, including golden apple snail (discussed in the example above), some fish, snails and edible weeds disappeared, decreasing the sources of protein, minerals and vitamins for the peoples. This is

also true for the *muyong* (forest areas) of Ifugao, Cordillera, Philippines. The muyong are created by people to assist the re-growth or growth of a forest to contribute to sustaining water for ricefields and other areas. Gmelina invaded some muyong and decreases in water were observed. (Source: Interview with Velasco Madangeng, member of Bokiawan Farmers Organization, Brgy. Bokiawan, Hungduan, Ifugao, Cordillera Region, Philippines (Excerpt from the Video BARALAGA, April 2011)).

Management
In the management of IAS, the bottom-up approach often results in success. It is good to take into consideration customary law and other cultural practices like *holok.* Holok refers to a distinctive pest management system practiced by the Ifugao people of Hingyon that utilizes the various parts of more than 25 plants to produce a pesticide against army worms and other rice pests. The holok, as traditionally practiced, was part of the *hongan di pageh*, the system of Ifugao rituals on rice culture (Source: Value Indigenous Knowledge, by TFIP, Tebtebba, BSU-ISRD and PTKN).

4.12. Aquatic species, Philippines

Jovelyn Cleofe

Conceptualisation
In the Philippines in general, communities tend to start thinking about negative impacts of IAS once they cannot be controlled and they are overtaking native species. At first, IAS are often accepted, because they can be a source of food or economic revenue. There are exceptions: when there were proposals to introduce live shrimp stock such as *P. vannamei* from Taiwan and Panama into fishponds for increased food production and income, there were many objections from the start because of the possibility of introducing new pathogenic viruses and other diseases.

Trends
There are coastal, marine and terrestrial IAS in the Philippines (inland waters: Suckermouth catfish, janitor fish, edible catfish from Thailand, tilapia, molly fish, common carp, etc.).

Drivers
All these species have been introduced in good faith, often in cultivated areas, but escaped into the wild, and proliferated fast. For example, molly fish were introduced to eat mosquitoes.

Impacts
All species are overtaking endemic fish in inland waters.
Edible catfish from Thailand have replaced native catfish.
Molly fish eat native species.

Management
The government recognized the issue, so in 2016 they formulated a national IAS strategy and action plan with three stages (2016-2018, 2019-2020, 2021-2026). There is an IAS management

framework and there will be an office and a government agency. Prevention, early detection, control and eradication and restoration of ecosystems that were destroyed by invasive species are key aims. Engagement with indigenous peoples' groups can be limited. In order for local communities and indigenous peoples' groups to make an informed choice, information needs to be provided in terms of the pros and cons of an IAS, rather than only a focus on positive economic benefits and food security. Communities need to be organised, speak with one voice and be registered in order to really participate, which can limit participation.

There are no efforts to eradicate tilapia as they have been integrated into diets and are an important part of food security.

4.13. Kamchatka King Crab, Russia

Polina Shulbaeva

Conceptualisation

For many people the Kamchatka king crab (*Paralithodes camtschaticus*) is an expensive delicacy, but for Saami it is a predator that kills everything and destroys traditional fishing. People in Kamchatka ate the crabs traditionally, but the Saami do not, and they have no spiritual values associated with them. Some governments like the crab because of its economic benefits, and often there is not enough consideration of biodiversity and traditional livelihoods.

Trends and drivers

One crab lays 100-500,000 eggs per year. The crab has invaded all Arctic regions, and covers Japan, Korea, Alaska, Bering Sea and Norway. It is still migrating and moving. It is listed as one of the most dangerous species in Russia and Norway. Climate change may also be having an impact.

Impacts

The crab kills fish and small crabs. It has a big influence on the catch of Saami traditional foods, and therefore on fisheries, occupations and lifestyles. The Coastal Saami have licences for fish quotas for cod and salmon, but there are so many crabs that sometimes the nets are full of crabs and it is impossible to fill the fish quotas. A fish licence does not allow you to sell crabs to stores, restaurants or markets. To have a licence for crabbing, a boat needs to be more than 8 metres long, and small communities do not have these boats, so they cannot benefit from the crabs. They can therefore only use them for food, and people are catching too many crabs to eat. Also, if small communities do not catch enough fish, they will not be given a fishing license for the next year, or the quota will be reduced. As a result, many communities cannot generate enough money for a good quality of life. It also destroys coastal fauna and biodiversity for the whole region. The problem is so big that the Government of Norway created a department just to work on the crab.

4.14. Giant Hogweed, Russia

Polina Shulbaeva

Conceptualisation

The hogweed (*Heracleum sosnowskyi*) is seen by communities as an invader of the land, which should be eradicated.

Trends

It originally grew in the Caucasus Mountains. It is now found in all territories of Siberia, in the arctic, in Norway (Tromso) and Alaska. It spreads very quickly.

Impacts

Hogweed is very dangerous for people. It is very useful when it is small, nutritionally, but when large and it flowers it is very poisonous. It can cause burns, anaphylactic shock, blindness and death. It is a huge problem for IPLCs, as many do not know how dangerous this plant is as they have not seen it before, and it is very beautiful. Some people think they can use it for fuel, which brings them into contact with it. It also has negative impacts on animals.

Management

It is very difficult to remove or eradicate. Seeds remain in the ground for 5-7 years. IPLCs are trying to eradicate it, and this is very important because it is seen as an invader of the land. A biologist has told them that they need to remove not only the umbrella but also the roots. The communities are monitoring every year, and they try to eradicate and educate. They are managing this themselves. They monitor it and report it to a government agency, but their lands are quite isolated, so the indigenous peoples have to try to manage it themselves.

4.15. Water plants, Senegal

Ndiaga Sall

Trends

The Senegal River in the north of Senegal has been invaded by invasive plants, including Typha domingensis, Salvinia molesta, Mimosa pigra, Mitragyna inermis, Pistia stratiotes, and Ceratophyllum demersum.

Impacts

The plants impact water flows, navigation and irrigation.

Management

Common cross-border programs are important because the river runs through different countries, and the same species pass from one country to another. A key issue is a lack of consultation with IPLCs in the area. They experience the impacts on a day-to-day basis, but they are often not consulted about impacts and management. Instead these decisions tend to be made externally, and IPLCs are engaged to do the manual work. Consultation with IPLCs would improve outcomes for the environment and people. There are different groups experiencing

different impacts from the plants, including fishers on the river and farmers using irrigation from the river. It is important to understand the network of impacts, and impacts from management strategies, in order to successfully engage with the problem, and to do this IPLCs should be involved in defining problems and developing programmes.

4.16. Mimosa pigra, Zambia

Albert Nzovu

Trends and drivers

Mimosa are considered one of the most serious IAS around Lochinvar National Park in Zambia. This invasive species, known locally as 'Toonje' in the Tonga language, is not native or indigenous to the area. They reproduce quickly, adapt to new areas easily, and have few natural enemies in Zambia. They are introduced accidentally or intentionally outside of their natural range. Mimosa invaded close to 300 hectares of ecosystem on the Kafue Flats, a vast area of swamp, open lagoon and seasonally inundated flood-plain on the Kafue River.

Impacts

The mimosa takes over habitats and change the ecosystem, harming property, plants and animals. On the Kafue Flats the mimosa displaced wildlife species such as Kafue lechwe (semi-aquatic antelope), wattled crane and many water birds, and reduced the areas available for other water birds including goose, jakana, squacco heron and pied kingfisher. Nesting areas are also impacted. Mimosa also reduces the grazing range for wildlife.

When the plant is touched it shrinks and fold its leaves to expose its thorns to defend itself, and the thorns are harmful.

It also impacts people, as it reduces the range for grazing and also access to water for livestock. It also hinders access to fishing, which some local people depend on, and fishing gear can get caught in the mimosa leading to a poor catch. It also reduces farmland, which can then cause hunger in the communities.

Management

Management is often done through mechanical processes by slashing and burning. In this way it can be controlled to an extent, but it is very stubborn.

5. Next steps

The following next steps took place after the dialogue workshop:

- The IPBES team did follow up calls and emails where needed for participants who did not have enough time during the workshop or who could not be heard due to connection problems.

- The IPBES team drafted a report from the dialogue workshop (this report) and comments for the first order draft review process. The draft report and comments were sent to all participants for their edits and additions by 17 October 2020. After some edits, and as there were no objections, the comments were submitted through the external review process on 18 October 2020.

- Participants were also invited to personally participate in the review period for the IAS assessment, that ran until 18 October. Participants were invited to contact the IPBES team for any assistance (for example, the IPBES team could send a version of the chapter drafts where all the sections on ILK and IPLCs were highlighted, or help with translation from French and Spanish)

Other upcoming IPBES activities were highlighted, including:

- Values assessment: Review of second order draft chapters and first order draft of the summary for policymakers (15 January to 19 March 2021).

- Sustainable Use of Wild Species: Review of second order draft chapters and first order draft of the summary for policymakers (15 April to 10 June 2021).

- Nexus and transformative change assessments: Calls for author nominations expected to take place in 2021.

6. Annexes

Annex 1: Agenda

Day 1 (Tuesday, 29 September 2020, 2.00 pm to 5.00 pm CEST)			
Hour	**Duration**	**Session**	**Speakers**
1st hour	30 mins	Welcome, introductions	Peter Stoett, Lucy Mulenkei
	10 mins	Objectives and methods for workshop	Peter Bates
	10 mins	IPBES and ILK background	Peter Bates
	10 mins	Introduction to the invasive alien species assessment	Peter Stoett, Tanara Renard
2nd hour	15 mins	Questions / discussion	All
	15 mins	ILK presentations	tbc
	10 mins	Discussion / questions	All
	5 mins	Break (5 mins)	
	15 mins	Chapters 1 to 3 of assessment	Peter Stoett, Sebataolo Rahlao, Esra Per
3rd hour	15 mins	Discussion	All
	15 mins	Chapters 4 to 6 of assessment	Ellen Ryan-Colton, Ana Isabel González Martínez, Patricia Howard
	15 mins	Discussion / questions	All
	15 mins	Closing of day, outline of next 2 days	Peter Bates

Day 2 (Wednesday, 30 September 2020, 8.00 am to 11.00 am CEST)		
Hour	**Duration**	**Session**
1st hour	15 mins	Welcome, introductions, agenda for the day
	15 mins	ILK presentations
	15 mins	Discussion on presentations
	30 mins	Discussion: Concepts, trends and drivers (Chapters 1, 2 and 3) Questions from previous day
2nd hour	15 mins	ILK presentations
	15 mins	Discussion on presentations
	5 mins	Break
	25 mins	Discussion: Impacts, management strategies, policies and the future (Chapters 4, 5 and 6) Questions from previous day
3rd hour	30 mins	Discussion: Any overarching issues that have not been addressed?
	15 mins	Closing and next steps (follow up, report, review comments, future steps)

Day 3 (Thursday, 1 October 2020, 4.00 pm to 7.00 pm CEST)		
Hour	**Duration**	**Session**
1st hour	15 mins	Welcome, introductions, agenda for the day
	15 mins	ILK presentations
	15 mins	Discussion on presentations
	30 mins	Discussion: Concepts, trends and drivers (Chapters 1, 2 and 3) Questions from previous day
2nd hour		
	15 mins	ILK presentations
	15 mins	Discussion on presentations
	5 mins	Break
	25 mins	Discussion: Impacts, management strategies, policies and the future (Chapters 4, 5 and 6) Questions from previous day
3rd hour		
	30 mins	Discussion: Any overarching issues that have not been addressed?
	15 mins	Closing and next steps (follow up, report, review comments, future steps)

Annex 2: FPIC document

Free Prior Informed Consent (FPIC) principles for sharing of knowledge during the Indigenous and local knowledge dialogue workshop for the IPBES Invasive Alien Species Assessment
Online meeting, 29 September to 1 October

The individuals, whose names are listed at the end of this document in annex 3, agreed during the dialogue workshop to follow the principles and steps laid out in the document.

Background
Within the framework of the UN Declaration on the Rights of Indigenous Peoples (UNDRIP), principles of Free Prior Informed Consent (FPIC) apply to research or knowledge-related interactions between indigenous peoples and outsiders (including researchers, scientists, journalists, etc.). Given that the dialogue process includes discussion of indigenous knowledge of biodiversity and ecosystems, there may be information which the knowledge holders or their organizations or respective communities consider sensitive, private, or holding value for themselves which they do not want to share in the public domain through publications or other media without formal consent.

Objectives of the workshop
For IPBES, the objective of the workshop is to learn from participants about their perspectives on invasive alien species. The aim is to gather a series of recommendations for the Invasive Alien Species Assessment, which will be used to inform the further development of the assessment. Other results may include case studies that illustrate Invasive Alien Species Assessment themes. It is hoped that the workshop will provide an opportunity for all participants to learn more about IPBES and the Invasive Alien Species Assessment, and to reflect and learn from one another about how indigenous and local knowledge can influence environmental decision-making.

Principles
The dialogue will be built on equal sharing and joint learning across knowledge systems and cultures. The aim is to create an environment where people feel comfortable and able to speak on equal terms, which is an important precondition for true dialogue.

To achieve these aims, the following dialogue goals are emphasized:

- Equality of all participants and absence of coercive influence
- Listening with empathy and seeking to understand each other's viewpoints
- Bringing assumptions into the open

If at any point during the dialogue workshop participants feel that the above goals are not being achieved, participants are asked to bring this to the attention of the workshop organizers in a timely fashion.

Sharing knowledge and respecting FPIC

To ensure that knowledge is shared in appropriate ways during the workshop, and that information and materials produced after the workshop are used in ways that respect FPIC, we propose the following:

1. Guardianship – participants who represent organizations and communities
   - Participants who represent organizations or communities will act as the guardians of the use of the knowledge and materials from their respective organizations or communities that is shared during or after the workshop. Any use of their organizations' or communities' knowledge will be discussed and approved by the guardians, as legitimate representatives of their organizations or communities.
   - Guardians are expected to contact their respective organizations and communities when they need advice. Guardians are also expected to seek consent from their organizations or communities when they consider that this is required.

2. FPIC rights during the dialogue workshop
   - The FPIC rights of the indigenous peoples in the workshop will be discussed at the beginning of the workshop, until participants feel comfortable and well informed about their rights and the process, including the eventual planned use and distribution of information. This discussion may be revisited during the workshop, and will be revisited at the end of the workshop once participants have engaged in the dialogue process.
   - Participants do not have to answer any questions that they do not want to answer, and do not need to participate in any part of the workshop in which they do not wish to participate;
   - At any point, any participant can decide that they do not want particular information to be documented or shared outside of the workshop. Participants will inform organizers and other participants of this. Organizers and participants will ensure that the information is not recorded.
   - Permission for photographs must be agreed prior to photos being taken and participants have the right not to be photographed. Organizers will take note of this.

3. After the workshop
   - Permission will be obtained before any photograph of a participant is used or distributed in any form.
   - Participants maintain intellectual property rights over all information collected from them about themselves or their communities, including photographs.
   - Copies of all information collected will be provided to the participants for approval.
   - Any materials developed for the Invasive Alien Species Assessment or other IPBES products using information provided by participants will be shared with the participants for prior approval and consent.
   - The information collected during this dialogue workshop will not be used for any purposes other than those stated above, unless permission is sought and given by participants.
   - Participants can decline to consent or withdraw their knowledge or information from the process at any time, and records of that information will be deleted if requested by the participant. This is the case until the assessment is finalised and published, as then the final document cannot be changed.

The participants of the workshop listed in Annex 3 agreed to follow the principles and steps laid out in this FPIC document.

Annex 3: Participants of the dialogue workshop

Indigenous Peoples and Local Communities			
Jorge L. Andreve	Panama	Fundación para la Promoción del Conocimiento Indígena FPCI	Day 1, 3
Ramiro Batzin	Guatemala	Co-chair of the International Indigenous Forum on Biodiversity; Director General of Asociacion Sotz'il	Day 1, 3
Amanda Black	New Zealand	Lecturer/Researcher at the BioProtection Research Centre, Lincoln University	Day 1, 2
Jovelyn (Jovy) Cleof	Philippines	Philippines Country Co-Coordinator, LMMA Network International	Day 1, 2
Florence Daguitan	Philippines	Tebtebba Foundation	Day 1, 2
Melanie Dulfer-Hyams	Australia	Land and Sea Management Unit, Torres Strait Regional Authority	Day 2
Chrissy Grant	Australia	Jabalbina Yalanji Aboriginal Corporation	Day 1, 2
Jo Ann Guillao	Philippines	Partners for Indigenous Knowledge Philippines	Day 1, 2
Lynn Jacobs	Canada	Director of Environmental Protection, Mohawk Council of Kahnawà:ke	Day 1, 3
Johnson M Ole Kaunga	Kenya	Peace Advancement and Conflict Transformation (IMPACT)	Day 1, 3
Tame Malcolm	New Zealand	Te Tira Whakamataki (Maori Biosecurity Network)	Day 1, 2
Lucy Mulenkei	Kenya	Co-chair of the International Indigenous Forum on Biodiversity; Executive Director of the Indigenous Information Network	Day 1, 3
Albert Nzovu	Zambia	Conservationist / Village scout around Lochinvar National Park	Day 1, 3
Kamal Kumar Rai	Nepal	Researcher on Indigenous Science and Philosophy	Day 1, 2
Maria Elena Regpala	Philippines	Partners for Indigenous Knowledge Philippines	Day 1, 2
N'diaga Sall	Senegal	Coordinator of Enda Santé	Day 1, 3
Polina Shulbaeva	Russia	Regional Coordinator, Centre for Support of Indigenous Peoples of the North (CSIPN)	Day 1, 2
Ruth Spencer	Antigua	Coordinator- Training, outreach and resource mobilization of the Freetown Community Group/Caribbean Marine Managed Areas Network	Day 1, 3
Puke Timoti	New Zealand	Researcher for the Tuhoe Tuawhenua Trust	Day 2
Yeshing Upún	Guatemala	Asociacion Sotz'il	Day 1, 3

Assessment authors			
Peter Stoett	Canada	Chapter 1 / co-chair	Day 1, 2, 3
Anibal Pauchard	Chile	Chapter 1 / co-chair	Day 1, 2, 3
Sebataolo Rahlao	South Africa	Chapter 2	Day 1, 2
Alifereti Tawake	Fiji	Chapter 2	Day 2
Esra Per	Turkey	Chapter 3	Day 1, 2, 3
Ellen Ryan Colton	Australia	Chapter 4	Day 1, 2
Makihiko Ikegami	Japan	Chapter 4	Day 1, 2, 3
Ana Isabel González Martínez	Mexico	Chapter 5	Day 1, 2, 3
Bridget Bwalya Umar	Zambia	Chapter 6	Day 1
Patricia Howard	UK	Chapter 6	Day 1, 2, 3
Stanislav Ksenofontov	Russia	Chapter 6	Day 1, 2

IPBES			
Peter Bates	UK	Technical support unit for indigenous and local knowledge	Day 1, 2, 3
Veronica Gonzalez	Mexico	Technical support unit for indigenous and local knowledge	Day 1, 2, 3
Noriko Moriwake	Japan	Technical support unit for the assessment	Day 1, 2
Tanara Renard	France	Technical support unit for the assessment	Day 1, 2