# Discussion paper:
# The Multiple Evidence Base as a framework for connecting diverse knowledge systems in the IPBES

Maria Tengö, Pernilla Malmer, Eduardo Brondizio,
Thomas Elmqvist, Marja Spierenburg

Contact e-mail:
maria.tengo@stockholmresilience.su.se

Stockholm Resilience Centre
Research for Governance of Social-Ecological Systems
Stockholm University
A centre with: SEI Stockholm Environment Institute, The Beijer Institute of Ecological Economics
FUNDED BY MISTRA The Swedish Foundation for Strategic Environmental Research

2013-06-05

*We warmly welcome any comments or input on the Multiple Evidence Base approach and this paper. Please send your comments before July 1 2013 in an e-mail to pernilla.malmer@stockholmresilience.su.se*

## Foreword

This is a short version of a paper that the authors are developing in collaboration with a network of experts emerging from the Guna Yala-dialogue workshop in Panama, April 2012 (see www.dialogueseminars.net/panama). It is produced with the aim of informing the IPBES international expert and stakeholder workshop on the 'Contribution of Indigenous and Local Knowledge Systems to IPBES: Building Synergies with Science' (9-11 June 2013, Tokyo, Japan). Time was not sufficient to consult with all partners involved when we prepared the document. Thus the authors of this text are solely responsible of the content, which however draws on insights from a wider group of people. The text as work in progress is now on review with the wider network.

*We warmly welcome any comments or input on the Multiple Evidence Base approach and this paper. Please send your comments before July 1 2013 in an e-mail to pernilla.malmer@stockholmresilience.su.se*

This contribution is part of a knowledge dialogue project run by the Resilience and Development Programme - SwedBio - at the Stockholm Resilience Centre with economic support from the Swedish International Development Cooperation Agency (Sida).

How to cite this discussion paper:

Tengö, M, Malmer, P, Brondizio, E, Elmqvist T, Spierenburg, M 2013. The Multiple Evidence Base as a framework for connecting diverse knowledge systems in the IPBES. Discussion paper 2012-06-04. Stockholm Resilience Centre (SRC), Stockholm University, Sweden.

Available at: www.stockholmresilience.org

Stockholm Resilience Centre advances transdisciplinary research for governance of social-ecological systems with a special emphasis on resilience – the ability to deal with change and continue to develop.

The centre is a collaboration between Stockholm University, Stockholm Environment Institute and the Beijer Institute of Ecological Economics at the Royal Swedish Academy of Sciences. The centre is funded by the Foundation for Strategic Environmental Research, Mistra.

## 1. Introduction

Natural ecosystem processes support and enrich human lives and contribute to economies in a wide range of ways. How we may sustainably govern the ecosystems on which we depend is a tremendously complex challenge and to succeed we cannot afford to lose insights and information originating from multiple knowledge systems. Indigenous and local knowledge systems, as well as knowledge from practitioners, can provide complementary knowledge, methods, and practices, to the natural and social sciences in our understanding of the role of biodiversity and ecosystems for human well-being, sustainable management, scenarios and adaptive responses to change (Reid et al. 2006). In some regions, and for some aspects of governance in social-ecological systems, our sole source of knowledge may reside among local users and managers. Furthermore, the concerns for unsustainable pathways of humanity are shared across cultures and societies. This creates potential for moving into co-production of knowledge across knowledge systems for new evidence and insights for more sustainable ways into the future. While this is increasingly acknowledged in science and policy spheres, there has so far been limited success in bringing knowledge systems together beyond case studies, and there is a great need to develop functioning mechanisms to proceed in legitimate, transparent, and constructive ways. To create synergies across diverse knowledge systems, we need to recognize different approaches for connecting and learning across systems that recognizes key challenges involved.

The recently launched Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) of the United Nations features prominently indigenous and local knowledge as part of its assessment agenda. There is a great opportunity for IPBES to develop an infrastructure that can enable synergies between knowledge systems in its work. We present here a first step to outline such an approach, the *Multiple Evidence Base*, with the aim to stimulate a discussion among all parts involved. A paper in process will further outline the Multiple Evidence Base in more detail.

**Box 1. In a nutshell: Multiple Evidence Base**

- Indigenous, local, and scientific knowledge systems are different manifestations of equally valid and useful knowledge systems which generate complementary evidence for interpreting conditions, change, trajectories, and causal relationships relevant to the sustainable governance of ecosystems and biodiversity.
- Moving away from translating knowledge into one currency, i.e. integrating local and indigenous knowledge into science.
- Different criteria of validation should be applied to data and information originating from different knowledge systems.
- Generates an equal starting point for mutually agreed ways to proceed, including the potential for co-production of knowledge.

The Multiple Evidence Base is an approach that proposes parallels whereas indigenous, local and scientific knowledge systems are viewed to generate different manifestations of valid and useful knowledge. Each system can contribute to sustainable management of ecosystems – through complementarities as well as new ideas and innovation from cross-fertilization across knowledge systems. See Figure 1. The Multiple Evidence Base highlights the importance of indigenous and local knowledge systems on their own terms, where evaluation of knowledge as useful and relevant for the issue of investigation occurs within rather than across knowledge

systems. It also recognizes differences within different types of scientific knowledge and forms of evidence. Brought together, multiple evidence on an issue (or assessment topic in the IPBES), such as Arctic sea ice dynamics, creates an enriched picture of understanding in an assessment process. The enriched picture is also a starting point for further knowledge generation, within or across knowledge systems through cross-fertilization and co-production of knowledge.

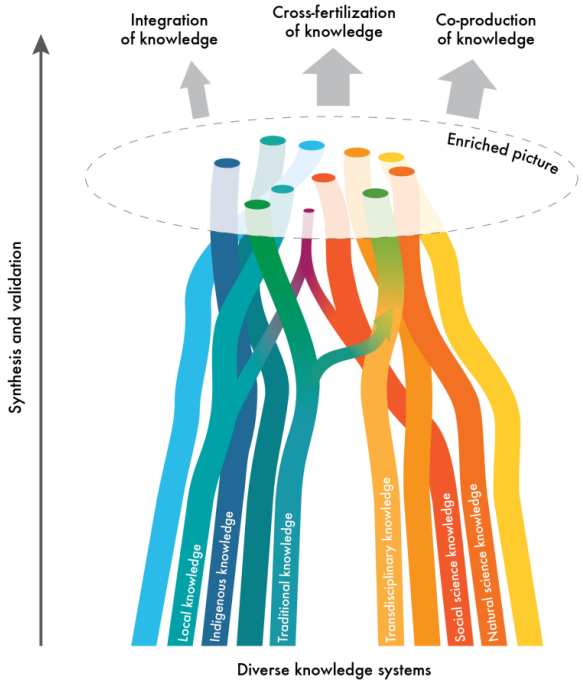


**Figure 1.** An outline of a Multiple Evidence Base approach, where diverse knowledge systems contribute to generate an enriched picture of a selected problem or issue of concern. The enriched picture can serve as a legitimate starting point for further analysis and knowledge generation.

## 2. Integration, parallel approaches, and co-production for synergies between knowledge systems

As a starting point for any discussion of connecting knowledge systems, it is essential to keep in mind that knowledge systems have always cross-fertilized and benefitted from each other and rarely is developed in isolation. Here, we would like to differentiate between integration of knowledge, parallel approaches to developing synergies across knowledge systems, and co-production of knowledge. Integration is an often used term when discussing indigenous and local knowledge. Generally, what is meant is a process where components of one knowledge system are incorporated into another through a validation process. This one-way process has been criticized for a number of reasons (see for example Nadasdy, 1999; Nakashima & Roué, 2002). In contrast, a parallel approach emphasizes complementarily between knowledge systems while avoiding validation across knowledge systems (Agrawal, 1995; Berkes, 2007; Nadasdy, 1999). Lastly, co-production of knowledge entails engaging in mutual processes of knowledge generation at all stages in a processes of assessment or knowledge generation. It is important to consider that the use of these terms depends on the question and issue at hand, and the level/scale at which they are applied. The type of complementarity and co-production envisioned should be part of a collaborative process between those involved from the onset.

## 2.1 Validation and evaluation of knowledge

In different knowledge systems the criteria and methods to validate knowledge can differ significantly. For example, quantitative research within the natural and social science knowledge systems relies on peer review, repeatable experiments and results, whereas qualitative research in the social sciences uses different approaches to validation. Here, validity is interpreted as the extent to which our observations reflect the phenomena we are interested in, and implies continually checking, questioning and theoretically interpreting findings. For example, one can use different data sources in attempts to triangulate, checking the meaning of extreme cases, looking for contrary examples, checks for rival explanations, and obtaining feedback from collaborators. A related approach to validation is 'communicative validity', in which the validity of knowledge claims is tested in a dialogue – with informants and peers (Kvale, 1995). Knowledge systems such as among indigenous peoples and local communities in turn uses their own (system specific) means of achieving social legitimacy of knowledge and hence its validation, including i.e. empirical or experiential validation, cultural or collective validation and moral validation (see contribution from Ishizawa in Tengö and Malmer et al. 2012, page 22).

The challenge of validation has been a historical problem for the social sciences, where tensions between objective and subjective approaches, in spite of their complementarity, have limited the understanding of social relations, human interactions with the environment and decision making. As is commonly experienced in research that crosses disciplinary divides, using the validation methods of one certain system (e.g. quantitative natural science) to validate knowledge from other systems (e.g. quantitative social science or indigenous knowledge systems) may lead to compromising the quality or integrity of the latter knowledge, potential rejection of valid knowledge, as well as failure to capture claims and perspectives of knowledge holders in policy related processes (e.g. Agrawal, 1995). Increasingly, conceptual frameworks have been used as tools for inter- and trans-disciplinary collaboration and as a way to overcome these limitations (Ostrom, 2011). A Multiple Evidence Base approach builds upon these efforts by calling attention to the importance of bringing together multiple knowledge systems.

# 3. The Multiple Evidence Base approach

A Multiple Evidence Base approach emphasizes the complementarity of knowledge systems and the values of letting each knowledge systems speak for itself without necessarily external validation. Placing insights from knowledge systems in complement to each other creates an enriched picture of a case study or the broader issue of investigation. A first proposal for a multiple evidence base approach was presented in a report from the International Science Workshop on Assessments for IPBES[1]. "The [multiple] evidence-based peer-review process takes into account that different criteria of validation should be applied to data and information originating from different knowledge systems. '[Multiple] evidence-base' means that in the assessments, the different knowledge systems are viewed as generating equally valid evidence for interpreting change, trajectories, and causal relationships". Here, we further develop the approach in collaboration with representatives from diverse knowledge systems, including indigenous and local knowledge systems as well as natural and social sciences.

[1] Workshop report, International Science Workshop on Assessments for IPBES, United Nations University, Tokyo, Japan. 25-29 July 2011

The approach is based on the insights that there are power issues involved when connecting different branches of science with locally based knowledge systems (Agrawal, 1995; Nadasdy, 1999), and while there are similarities and overlap across knowledge systems, there are aspects of each that cannot be fully translated into another (Tengö and Malmer et al., 2012). The parallel approach applied in the MEB aims to enable connections across knowledge systems in a respectful and equal manner, as a way to represent genuine accounts of diverse knowledge systems in a way that may leverage the power dynamics, maintain integrity of knowledge systems, generate new questions, and thus enable ecosystem assessments and knowledge generation that is salient, credible, and legitimate for knowledge holders at different scales (Cash et al. 2003, Reid et al. 2006). Table 1 presents some examples of case studies where a multiple evidence based approach has been used.

**Table 1.** Examples of case studies using a multiple evidence approach

| **Issue investigated** | **Multiple Evidence Base** | **Reference** |
|---|---|---|
| Relationship between Arctic sea ice and climate change | Reviews Inuit and scientific understanding of the relationship, based on peer-reviewed papers. | (Laidler, 2006) |
| Monitoring of sustainable customary wildlife harvests in Canada and New Zealand | Data sharing and calibrating traditional monitoring methods against scientific abundance measures (*titi,* New Zeeland) Interviews and collaborations with hunters. | (Moller, Berkes, Lyver, & Kislalioglu, 2004) |
| Land cover change in the Wild Coast, Eastern Cape, South Africa | Comparing local and scientific understanding of land use change and underlying drivers. Interviews with local experts, local representatives, and reviewing scientific literature on forest-savannah dynamics | (Chalmers & Fabricius, 2007) |
| Natural history and movements of large marine mammals in Alaska | Combining satellite tracking and traditional knowledge of species movements based on interviews. | (Huntington, Suydan, & Rosenberg, 2004) |
| Fish population monitoring and modelling of spatial dynamics. | Combining knowledge of fish behaviour and distribution in British Columbia, Canada. Interviews with fishery scientists, fishery managers, and local fishers. | (Mackinson, 2001) |
| Assessment of trends and fishing practices in Newfoundland fisheries | Assembling and cross-checking information on changes in fishing practices, based on interviews with fishermen | (Neis et al., 1999) |
| Ecology of Arctic Fox and Snow Goose in Nunavut, Canada. | Investigating the complementarity of Inuit TEK and scientific knowledge across spatial and temporal scales. Workshops, interviews, mapping for collecting TEK, review of scientific information. | (Gagnon & Berteaux, 2009) |
| Agroforestry intensification in the Amazon estuary | Investigation involved learning and doing experiments with estuarine small farmers on the management techniques used to intensify food production (acai palm fruit) without deforestation. Mapping and quantitative data. | (Brondizio, 2008) |

The enriched picture can enable triangulation of information across knowledge systems and thus evaluation of the relevance of knowledge and information at different scales and in different contexts. It creates an opportunity for "a culturally informed appraisal of scientific knowledge and practice so as to differentiate between elements that could be recognized as

"universal" or shared among knowledge systems as opposed to "relative" or unique to a specific knowledge system" (IPBES 1 INF 5). For example, it has been shown that combining scientific and traditional methods for monitoring wildlife provides an opportunity for customary users for scrutinize science and for science to learn relationships and processes previously unknown. In addition to enhancing the relevance to knowledge used for decision making, it enhances trust and avoids the arrogance of a single "right approach" represented by science (Moller et al., 2004, see also Mackinson, 2001). This in turns led to better monitoring practices and enforcement.

## 3.1. Multiple Evidence Base in the IPBES

Figure 2 outlines a Multiple Evidence Base as three basic stages for consideration by IPBES. First, it emphasizes the importance of defining problems and goals in a collaborative manner. While the plenary and MEP set priorities for IPBES, the onset of a particular activity should involve relevant stakeholders. Since IPBES activities may or may not include clearly defined geographical areas, it may require the involvement of different social groups at different levels of analysis. At this stage, the elements of a 'nested approach' should be considered. While challenging, the co-production of problem/goal definition is particularly important to create a collaborative platform for synergies across knowledge system. It is also important for the development of an institutional culture that accepts the inherent complexity of issues related to IPBES. The second phase of an assessment process sets forward a Multiple Evidence Base approach unique to the problems and goals defined in the first phase. Based on the emerging picture, similarities, complementarities, as well as contradictions across knowledge systems can be evaluated and discussed, and form the basis for a more complete assessment as well as further knowledge generation. Finally, involved parts should consider and reflect on the social and environmental implications of results, including a re-assessment of knowledge gaps and new opportunities for collaborative activities. The assessment process should be in itself evaluated as part of a constructive and cumulative learning process.

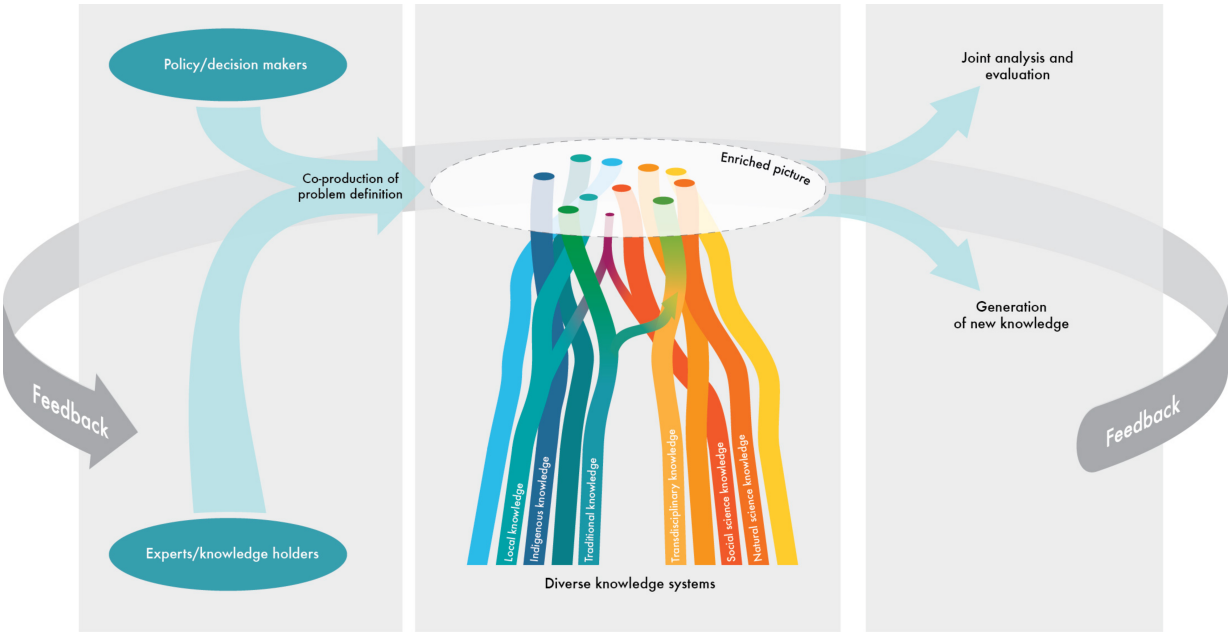


**Figure 2**. Outlining three phases of a Multiple Evidence Base approach, that emphasizes the need for co-production of problem definitions as well as joint analysis and evaluation of the enriched picture created in the assessment process.

### 3.2. Multiple Evidence Base and scale

As described above, we propose the MEB as a 'nested approach' that considers different types of knowledge (from very specific to more general) and different types of overlap between knowledge systems that may appear at different levels (and for different goals). The type and level of complementarity across knowledge system will vary according to context, the issue addressed and the desired outcomes. For example, the process of a Multiple Evidence Base may differ whether the concern is synthesis of drivers of change and responses in a particular geographical region, such as in the Satoyama/Satoumi assessment of Japan (Japan Satoyama Satoumi Assessment, 2010) or a synthesis of responses to e.g. biofuel production across the world. The scale of observation that form the basis for different knowledge systems is critical when evaluating the congruence between them for a given subject (Gagnon & Berteaux, 2009). Studies show that different knowledge systems often are complementary in terms of which scale they focus on, and that the combination of approaches leads to better understanding of cross-scale interactions (Gagnon & Berteaux, 2009; Laidler, 2006). As illustrated in figure 2, the process of defining these goals, however is fundamental to avoid a mismatch of expectations.

Furthermore, scale also matter in the definition, collation, compilation and aggregation of knowledge horizontally e.g. across local communities and vertically, i.e. the implications for scaling knowledge up and down for decision making (Reid et al., 2006). New methods are needed to find innovative ways for legitimate and constructive ways of aggregating, evaluating and synthesizing knowledge to inform scales beyond the local (Berkes et al., 2006). Geographical centers for compiling knowledge and insights, similar to the Satoyama/Satoumi process (Japan Satoyama Satoumi Assessment 2010) using a Multiple Evidence Based approach may be part of a solution. One example that can be studied as an interesting example of connecting scales and knowledge systems is the on-going bottom-up process for mobilizing indigenous and local knowledge for monitoring of biodiversity, ecosystems, and human wellbeing called Community Based Monitoring and Information Systems (CBMIS). CBMIS is a joint initiative among a global network of indigenous peoples and local communities, which seeks to combine the monitoring needs of communities with need for detailed data as a base for joint action related to territories and resources. The initiative emerged in cooperating with the CBD Secretariat and the UN Permanent Forum on Indigenous Issues. Initially regional and thematic workshops were organized to identify indicators relevant for indigenous peoples, towards monitoring local to global progress in achieving internationally agreed environment and development goals. The network is now advancing in developing tools and methods to a common instrument which can be used by communities.

## 4. Conclusions

Indigenous and local knowledge systems, as well as knowledge from practitioners, can provide complementary knowledge, methods, and practices, to the scientific understanding of the role of biodiversity and ecosystems for human well-being, sustainable management, scenarios and adaptive responses to change (Reid et al., 2006). The potential of this knowledge is not yet realized. However, IPBES has a clear ambition to build on insights from diverse knowledge systems. We see the development of a Multiple Evidence Base within IPBES as a promising step in the right direction. The following are key challenges to address in developing a Multiple Evidence Base within IPBES:

- **Fundamental values.** It is important to establish frameworks to promote and enable equal and transparent connections between knowledge systems. Within such a framework it is essential that fundamental values such as respect, trust, reciprocity and equal sharing is characterizing all interactions at all scales. When sharing knowledge, Free Prior Informed Consent and existing guidelines should always be applied.
- To enable successful synergies across knowledge systems there is a **need for true dialogues,** which gives/promotes credibility and legitimacy for those involved (e.g. Cash et al., 2003). The Multiple Evidence Base is an approach for reaching the levels of trust and respect required for dialogues leading to changing mental models and widened perceptions on how knowledge systems can cross-fertilize among all knowledge holders. For example, the development of parallel sets of validation criteria in the IPBES needs to be based on an inclusive and transparent dialogue.
- The **development of a procedure** whereas the problem definition, the assessment process, and the evaluation of findings from the onset involves co-production and collaboration with relevant stakeholders. While challenging, the co-production of problem/goal definition is particularly important to create a collaborative platform for synergies across knowledge systems. It is also important for the development of an institutional culture that accepts the inherent complexity of issues related to IPBES.
- **Need for new methods.** IPBES is a great opportunity to develop new tools and approaches for co-production of questions and issues, methods for mobilizing, documenting and sharing knowledge for the enriched picture, as well as methods for co-production of analysis and insights based on the enriched picture (see figure 2). This is not only needed to facilitate collaboration between local and scientific knowledge, but between types of scientific knowledge. There is also great potential in learning from "success stories" where mutually beneficial cross-fertilizations across knowledge systems had occurred.
- A key challenge is **making indigenous and local knowledge matter** at scales beyond the local (Reid et al. 2006), while avoiding loss of legitimacy among knowledge holders as well as decision makers at different levels. Local responses to environmental changes can mediate or reinforce global dynamics, and cross-scale interactions needs to be better understood to support and encourage stewardship of the biosphere (Folke et al., 2011). A Multiple Evidence Based approach should be considered in relation to different goals, regions, and kinds of assessment and scales of investigation, but also needs to recognize cross-scale interactions.

To conclude, we view connecting knowledge systems not only as a way to mobilizing existing knowledge for assessments and improved policy, but also as a way to support and enhance existing mechanisms for learning about the dynamics of social-ecological systems at all scales, to build resilience and capacity for transformation that includes empowerment of indigenous peoples and local communities.

## 5. References


Agrawal, A. (1995). Dismantling the Divide Between Indigenous and Scientific Knowledge. *Development and Change*, *26*(3), 413–439.

Berkes, F. (2007). *Sacred Ecology* (2nd ed., p. 336). New York: Routledge.

Berkes, F., Reid, W. V., Wilbanks, T., & Capistrano, D. (2006). Conclusions. Bridging scales and knowledge systems. *Bridging scales and knowledge systems. Concepts and applications in ecosystem assessments* (pp. 315–331). Washington D.C.: Island Press.

Brondizio, E. S. (2008). *Amazonian Caboclo and the Acai Palm: Forest Farmers in the Global Market.* (p. 402). New York: The New York Botanical Garden Press.

Cash, D. W., Clark, W. C., Alcock, F., Dickson, N. M., Eckley, N., Guston, D. H., Jager, J., et al. (2003). Knowledge systems for sustainable development. *Proceedings of the National Academy of Science*, *100*(14), 8086–8091.

Chalmers, N., & Fabricius, C. (2007). Expert and Generalist Local Knowledge about Land-cover Change on South Africa's Wild Coast: Can Local Ecological Knowledge Add Value to Science ? *Ecology And Society*, *12*(1), 10.

Folke, C., Jansson, Å., Rockström, J., Olsson, P., Carpenter, S. R., Chapin, F. S., Crépin, A.-S., et al. (2011). Reconnecting to the Biosphere. *Ambio*, *40*(7), 719–738.

Gagnon, C. A., & Berteaux, D. (2009). Integrating Traditional Ecological Knowledge and Ecological Science : a Question of Scale. *Ecology and Society*, *14*(2).

Huntington, H. P., Suydan, R. S., & Rosenberg, D. H. (2004). Traditional knowledge and satellite tracking as complementary approaches to ecological understanding. *Environmental Conservation*, *31*(3), 177–180.

Japan Satoyama Satoumi Assessment: Socio-ecological Production Landscapes of Japan – Summary for Decision Makers. (2010). *Satoyama-Satoumi Ecosystems and Human Well-Being*.

Kvale, S. (1995). The Social Construction of Validity. *Qualitative Inquiry*, *1*(1), 19–40. Retrieved Laidler, G. J. (2006). Inuit and Scientific Perspectives on the Relationship Between Sea Ice and Climate Change: The Ideal Complement? *Climatic Change*, *78*(2-4), 407–444.

Mackinson, S. (2001). Integrating Local and Scientific Knowledge: An Example in Fisheries Science. *Environmental Management*, *27*(4), 533–545.

Moller, H., F. Berkes, P. O. Lyver, and M. Kislalioglu. 2004. Combining science and traditional ecological knowledge: monitoring populations for co-management. Ecology and Society **9**(3): 2.

Nadasdy, P. (1999). Politics of TEK: Power and the "integration" of knowledge. *Arctic Anthropology*, *36*(1-2), 1–18.

Nakashima, D., & Roué, M. (2002). Indigenous knowledge, peoples and sustainable practice. In T. Munn (Ed.), *Encyclopedia of global environmental change* (pp. 314–324). Chichester, UK: John Wiley & Sons.

Neis, B., Schneider, D. C., Felt, L., Haedrich, R. L., Fischer, J., & Hutchings, J. a. (1999). Fisheries assessment: what can be learned from interviewing resource users? *Canadian Journal of Fisheries and Aquatic Sciences*, *56*(10), 1949–1963.

Ostrom, E. (2011). Background on the Institutional Analysis and Development Framework. *Policy Studies Journal*, *39*(1), 7–27.

Reid, W. V., Berkes, F., Wilbanks, T., & Capistrano, D. (2006). *Bridging Scales and Knowledge Systems: Concepts and Applications in Ecosystem Assessment* (p. 345). Island Press.

Tengö, M., and Malmer, P.(eds), , et al. (2012). *Dialogue workshop on Knowledge for the 21st Century: Indigenous knowledge, traditional knowledge, science and connecting diverse knowledge systems.* Usdub, Guna Yala, Panama, April 10 – 13, 2012. Workshop Report.