Local knowledge, proven experience and scientific evidence

JOHANNES PERSSON

Local knowledge and proven experience

It is common to clearly differentiate between local and scientific knowledge. An early example is Stephen Toulmin and June Goodfield's comparison between scientific knowledge and knowledge generated in the "basic crafts".[1] According to the authors, the crafts—such as agriculture, medicine, metalworking, weaving, dyeing, perfumery and glass-making—are the oldest elements in human society: "There one can still hear the voice of the authentic practical man, suspicious of upstart theories only a few centuries old".[2]

A more recent example has emerged from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). A controversy between participants using two distinct framings, "ecosystem services" and "Mother Earth", led to a decision on a conceptual framework[3] that could be interpreted as dualistic. On the one hand, it contains the main elements and relationships for the conservation and sustainable use of biodiversity and ecosystem services, human well-being and sustainable development. These expressions are highlighted in green in the figure accompanying the decision. On the other hand, the figure contains expressions, in blue colour, such as "systems of life", "living in harmony with nature" and "Mother Earth".[4] In the IPBES-2 final report, this was transferred to the differentiation we are interested in in this paper: "text in green denotes the concepts of science; and text in blue denotes those of other knowledge systems".[5] It should be noted that the authors remark that this is a simplification, but it is nevertheless an example of a possible and rather sharp differentiation between scientific knowledge and local knowledge.

Our understanding of what local knowledge constitutes is far from perfect. The crafting of a theoretical term often requires another theoretical expression against which it can be developed and in relation to which it makes immediate sense. "Local knowledge" and its conceptual cousins are very much like that. One gets the feeling that local knowledge is only labelled as "local" when pitted against "scientific knowledge". Even major characterizations of local knowledge build on the contrast with scientific knowledge. Firket Berkes' criteria provide one example (although it should be noted that he in fact uses the expression "traditional ecological knowledge"). According to Berkes, local knowledge

1. is mainly qualitative (as opposed to quantitative)
2. has an intuitive component (as opposed to being purely rational)
3. is holistic (as opposed to reductionist)
4. considers mind and matter as united (as opposed to being separated)
5. is moral (as opposed to supposedly value-free)
6. is spiritual (as opposed to mechanistic)
7. is based on empirical observations and accumulation of facts by trial-and-error (as opposed to experimentation and systematic, deliberate accumulation of fact)
8. is based on data generated by resource users themselves (as opposed to that by a specialized cadre of researchers)
9. is based on diachronic data, i.e., long time-series on information on one locality (as opposed to synchronic data, i.e., short time-series over a large area).[6]

There are pros and cons of highlighting the science–local knowledge distinction. Among the advantages are that it clearly points to the fact that there is knowledge outside academic science and what is published in peer-reviewed papers. Among the disadvantages are that neither science nor knowledge outside academia are particularly homogenous. It might well be that intra-level variation exceeds inter-level differences. My conjecture is that this is the case with local knowledge.

I want to point to another possible approach to local knowledge. There is an interesting and relevant Swedish conceptual pair, *vetenskap och beprövad erfarenhet*, or "science and proven experience", which is useful to

compare with the internationally much more well-known distinction between scientific knowledge and local knowledge. In Sweden, clearly the notion of "science and proven experience" has been emphasized in various contexts. It has influenced the medical and health professions since the late 19th century, and arguably longer, and more recently the educational professions. The "proven experience" part of the pair is one variety of local knowledge, I would argue. What is special with the Swedish notion is that the relations between science and proven experience have been in focus, rather than the relata themselves. Swedish legislation requires that the decision-maker pays attention to both:

> Each physician, whether he be an employee at an institution or an independent practitioner of the medical profession, is obliged, as his chief duty, to deliver such counsel, and, as far as circumstances permit, to extend such therapeutic endeavours, to every patient under his care as are necessitated by the patient's condition and as are consonant with science and proven experience.[7]

However, the "proven experience" notion was relatively unchartered before a large research program funded by Riksbankens Jubileumsfond and led by Nils-Eric Sahlin was undertaken.[8] Johannes Persson, Annika Wallin, Barry Dewitt and Lena Wahlberg have reported that proven experience has an evidentiary role in clinical decision-making, and this role depends in part on its certainty and systematicity.[9] Three dimensions of proven experience that were found salient in the research program are that it can function as test or evidence, that professionals acquire it (someone becomes experienced/competent) and that it originates from or is accepted in practice. This conceptualization was shared by both physicians and nurses.[10]

In comparison, there has been plentiful interest in the notion of local knowledge from anthropology, development studies, conservation biology, etc. Several, although surprisingly similar, definitions have been proposed. So, how can the comparison be useful? One reason, I think, is precisely that the relations between science and proven experience are placed at the centre stage, and that this has not really been the case when local knowledge has been discussed. True, local knowledge has been important for turning our attention to questions of rights, legitimacy, etc., but more seldom—as far as I can judge—has the focus been on the

question about the relative strengths and weaknesses of local knowledge compared with scientific knowledge in decision-making in the real world. Exactly this question is often on the agenda when science and proven experience are discussed. This paper will clearly not contribute to the study of the history of the Swedish notion (or to the history of the notion of local knowledge in general), but I want to note that there might be an interesting connection between the fact that proven experience can apply to an individual who has experience of an activity and not only to the activity itself, i.e., you can be a person of proven experience and there can be proven experience of an activity (for instance, an intervention). For the Swedish reader I add a paragraph from 1720:

> Så bör ock vid alla embetens besättning förnämligast anses personernes bepröfvade erfarenhet och förtjänst, hvilka igenom studier, krigsförrättningar och flere nyttige vetenskaper gjordt sig till befordran värdige, men särdeles iakttages, att inge till alldeles ovane och med deras ämnen ej öfverensstämmande sysslor måge antagas, utan hvar och en befordras efter dess naturlige böjelse och erfarenhet, så att dugelige personer till tjänsterne förordnas; ej heller må någons förvärfvade höghet, gunst och anseende gifva en eller annan insteg i sådane sysslor och embeten, hvartill han ingen skickelighet hafver, mindre må någon för ringare stånd eller härkomst förskjutas, när han eljest till tjänsten bepröfvas vara skickelig och värdig.[11]

Putting a substantial value on diachronic, well-tried experience seems to yield Berkes' points 8 and 9. There is arguably an intimate connection between this feature of proven experience and the way he characterizes local knowledge. In addition, whereas it might be that today's ecologists favour synchronic data gathering by conducting experiments with short duration in many places at once rather than studying one ecosystem for a longer time,[12] by requiring that decision-makers should be individuals of proven experience the gap becomes reduced in size.

The growing importance of local knowledge: IPCC and IPBES

In modern times governmental bureaucracies have not always treated local knowledge as knowledge *per se*.[13] Sometimes local knowledge has been perceived primarily as an obstacle to progress in presence of scientific

knowledge. Arun Agrawal mentions the 1950s and 1960s, in particular.[14] Farmers' traditions have been described as "'backward', conservative, inefficient, inferior, and based on 'ignorance' or myths".[15]

However, this tendency has changed, if not everywhere then at least in important policy contexts, such as the intergovernmental panels on biodiversity and climate change. The reasons for this are interesting in their own right, but a subject for another paper. Part of the answer might be that scientific consensus is no longer enough for decision-making. The Intergovernmental Panel on Climate Change, IPCC, is recognized as a pioneer in providing policy-relevant science. It has orchestrated scientific knowledge on climate change: "In doing so it has spoken on behalf of global science with one voice, thereby acquiring a reputation as the epistemic authority in matters of climate policy. It was jointly awarded the 2007 Nobel Peace Prize along with former United States vice president Al Gore."[16] Almost from the start, IPCC utilized a strategy aiming to produce standardized assessments similar to the evidence-based medicine movement. It is widely known that IPCC has experienced challenges, and the critique in 2009–2010, when among other things it was communicated that grey literature was uncritically cited, probably strengthened the standardization strategy. Scientific, peer-reviewed knowledge became the gold standard.[17] Within evidence-based approaches, the integration of evidence, interpreted in this more rigorous way, with practical experience becomes a challenge, and the risk is that local knowledge will have no real place as evidence.[18] By implication IPCC has struggled with alternative forms of expertise, such as local knowledge[19]—knowledge that can be notoriously difficult to assign evidentiary value to within such a model. Then came the Paris Agreement in 2015 stating that climate change adaptation "should be based on and guided by the best available science and, as appropriate, traditional knowledge, knowledge of indigenous peoples and local knowledge systems, with a view to integrating adaptation into relevant socioeconomic and environmental policies and actions, where appropriate".[20] This ambition is interesting from the perspective of the interaction between science and local knowledge: mentioning is of course one thing, integrating is something very different. IPCC is rather distant from projects carried out locally (where it is more evident that and how local knowledge can play a role). Given its history, how could IPCC accomplish the task set out in the Paris Agree-

ment? The Technical Summary (TS) that complements and expands key findings up to 2021 provides an update. It clearly states:

> Compared to earlier IPCC assessments, this report integrates more strongly across the natural, social and economic sciences, highlighting the role of social justice and diverse forms of knowledge, such as Indigenous knowledge and local knowledge, and reflects the increasing importance of urgent and immediate action to address climate risk.[21]

Below are two examples from the Technical Summary:

> Indigenous knowledge and local knowledge can contribute to reducing the vulnerability of communities to climate change (medium to high confidence). Supporting Indigenous self-determination, recognising Indigenous Peoples' rights and supporting Indigenous knowledge-based adaptation are critical to reducing climate change risks and effective adaptation (very high confidence).[22]

> Taking account of interdisciplinary scientific information, Indigenous knowledge and local knowledge and practical expertise is essential to effective ecosystem-based adaptation (high confidence). There is a large risk of maladaptation where this does not happen (medium confidence).[23]

There is thus clear recognition in IPCC of the growing importance of local knowledge. Indigenous and local knowledge is increasingly referred to in IPCC reports.[24]

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, IPBES, accorded greater value to regional and local scales from the start. To one extent this is explained by the more local nature of what affects biodiversity. Moreover, an initial gap analysis indicated the need to include other, non-formal types of knowledge. IPBES started as a multistakeholder initiative involving actors from conservation and Indigenous peoples' organizations, prominent scientists, environmental agreements and state representatives.[25] An interesting debate on what counts as legitimate knowledge, how it is generated and how this influences its practical effectiveness took place in the formative period of IPBES:

> The knowledge of traditional and "ordinary" citizens might not meet scientific criteria or be amenable to standardization, but ignoring or misappropriating such experience undermines the possibilities for innovation.[26]

Thus, in the case of IPBES too, the establishment of the panel contributed to the growing recognition of the importance of local knowledge in decision-making.

In addition, there are clear indications that the use of local knowledge in scientific enterprises increases. For instance, Ryan Brook and Stéphane McLachlan found that, for journals indexed in the Biological Abstracts database, studies using experience-based local knowledge increased from less than 1% in 1980 to 8% in 2004.[27]

Scientific and local knowledge: A well-known but problematic distinction

The existing scientific literature on local knowledge uses the expression in rather similar ways. Three themes dominate the characterization of local knowledge: relations between living organisms and the local environment, the interaction between individuals and societies with the local environment, and the transfer of knowledge from generation to generation:

> Indigenous and local knowledge (ILK) refers to dynamic bodies of integrated, holistic, social and ecological knowledge, practices and beliefs pertaining to the relationship of living beings, including people, with one another and with their environments.[28]

> Traditional ecological knowledge is a cumulative body of knowledge and beliefs, handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment.[29]

> Indigenous knowledge is local knowledge—knowledge that is unique to a given culture or society. […] Such knowledge is passed down from generation to generation, in many societies by word of mouth.[30]

It might well be that these uses fit certain phenomena that we would agree constitute local knowledge. However, from an epistemological perspective there might be reason to be hesitant. It is clear that we want local knowledge and scientific knowledge to be used together in decision-making. When this happens it is likely that at least for the decision-maker in question their local knowledge (and perhaps their understanding of the scientific knowledge as well) is affected to some degree.

Now, this is something that research on local knowledge nowadays agrees with. The IPBES glossary speaks of "dynamic" bodies of knowledge, and others go further. Intepe and colleagues state that local knowledge is "a highly dynamic and diverse knowledge, constantly shifting with changing circumstances, environments, new layers of understanding, and through interactions with 'scientific' or 'Western' knowledge".[31]

However, the question is whether this dynamic character is compatible with the characterizations above. To be both dynamic and integrated is not easy, especially so if we are looking at a body of knowledge that is "handed down through generations". My suspicion is that Berkes' conceptualization cannot easily harness evidence and practice that evolve in the intersection between research and development and professional practice, at least not right away. Neither can it easily account for local knowledge that travels between local communities. It follows, as far as I can understand, that such a variety of local knowledge is difficult to combine with the idea of import of scientific evidence and other varieties of evidence into local knowledge. If this is true, it entails that Berkes' conception of local knowledge might lead to more isolated versions of local knowledge rather than more integrated ones.

An improved understanding should be open to the generation of new local knowledge (and new scientific knowledge) through the feeding of problems between science and local knowledge, much like the interaction between science and proven experience.

Three reasons against a sharp divide: Local knowledge in science

I want to conclude by briefly touching on three reasons that I believe tell against a sharp demarcation. They all have to do with the presence of local knowledge in science. (I agree that they should be presented

together with cases of scientific knowledge in local knowledge, but that would require a more careful analysis of what local knowledge is, and so has to await a later paper.)

First, it is evident that several scientific disciplines have imported much of their content from local knowledge throughout history. That local biological knowledge has been an important source in the early formation of biological science is clear. For instance, Rumphius' 17th-century work played a role in Linnaeus' classificatory work, and Rumphius certainly benefited from local biological knowledge in producing his catalogue, *Herbarium Amboinense*. He, his wife and his daughters took advantage of local knowledge in the production of the catalogue. His wife, Susanna, had access to traditional gynaecological knowledge of the local women that was not disseminated outside their circles. There are recordings of how one of his daughters "cunningly followed the teacher when she collected her mind-enhancing plant on a rubbish dump [...] and brought a specimen home".[32]

Second, science contains a great deal of essential knowledge that closely resembles local knowledge. The roles of skill and personal experience are often understated in the philosophy of science. Experiment, observation, speculation, calculation and measurement are essential components of science.[33] Setting up an experiment that works, designing a survey or measuring a phenomenon requires skill and experience. "Local knowledge is based on data generated by resource users themselves (as opposed to that by a specialized cadre of researchers)", says Berkes,[34] but in the field, or laboratory, there is no difference between resource users and scientists. There is, if you prefer, a vast domain of such local knowledge in science. It is usually not communicated to other kinds of decision-makers than scientists themselves. You need to be a skilled experimentalist in order to generate scientific evidence.

Third, local knowledge is relatively often imported into science, both as data and as hypotheses or results to be validated scientifically. For instance, local knowledge is imported into scientific assessments of the abundance and distribution of forest elephants in Cameroon's timber-production forests,[35] as there is not enough scientific data to build on in those remote areas.

Notes

1. Toulmin & Goodfield 1965.
2. Toulmin & Goodfield 1965.
3. IPBES n.d.
4. Díaz *et al*. 2015.
5. IPBES n.d., p. 2.
6. Berkes 1993.
7. Pontin 1891, § 59; my translation.
8. Persson *et al*. 2019.
9. Persson *et al*. 2022.
10. Dewitt *et al*. 2021.
11. Regeringsformen 1720, § 40.
12. Vucetich *et al*. 2025.
13. Norgaard 1984.
14. Agrawal 1995.
15. Thrupp 1989.
16. Beck *et al*. 2014.
17. Turnhout *et al*. 2012.
18. Persson *et al*. 2018.
19. Beck *et al*. 2014.
20. United Nations 2015.
21. IPCC 2023, TS A.1, Background.
22. IPCC 2023, TS B.7.2.
23. IPCC 2023, TS D.4.7.
24. Carmona *et al*. 2023.
25. Esguerra & van der Hel 2021.
26. Turnhout *et al*. 2012.
27. Brook & McLachlan 2008.
28. IPBES, glossary.
29. Berkes 1993.
30. Warren 1991.
31. Intepe *et al*. 2023.
32. Baas & Veldkamp 2014.
33. Hacking 1983.
34. Berkes 1993.
35. Brittain *et al*. 2020.

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