

# Why “Integrating” Western Science and Indigenous Knowledge Is Not an Easy Task: What Lessons Could Be Learned for the Future of Knowledge?

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## Abstract

*The potential of integration of Western science and indigenous knowledge, especially in fields like environmental management, is a much debated topic today. However, the difficulties involved in such a task are not always fully understood and, as a matter of fact, experiences of co-management have achieved only partially the expected outcomes. In this contribution, I show how the possibility of a sound integration depends on the possibility to accommodate different interpretations of reality and knowledge criteria, recognizing the value of pluralism and mutual learning. Some remarks on how this argument may be extended beyond the case study, and be relevant for the kind of future we want to envision for human knowledge are also provided.*

**Keywords:** Integrating Western science and indigenous knowledge; Environmental management; Epistemology; Epistemic diversity; Ecology of knowledges; Future of knowledge.

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## Introduction

Indigenous environmental practices and systems are acquiring growing worldwide recognition. Their employment concerns several different areas, such as climate change (Ford et al., 2016), fishery management (Espinoza-Tenorio, Wolff, Espejel, & Montaña-Moctezuma, 2013), and forest management (Parrotta, Yeochang, & Camacho, 2016).

More generally speaking, it begins to be acknowledged that Indigenous knowledge (IK) can provide new insights in the relationship humans can establish with nature, something that is highly relevant in an age of environmental crisis like ours, in which it becomes crucial to understand the link between knowledge systems, social practices, and the outcomes that these social practices are likely to produce.

A related and highly debated topic concerns how to “integrate” (or amalgamate, combine) scientific knowledge and IK, for example in environmental management. Several scientists and policy makers argue in favour of such an integration but, as outlined in an article recently published in *Science* (Mistry & Berardi, 2016), the difficulties involved in this task are not always fully understood.

In actual fact, experiences of co-management, where a system of mutual rights and obligations, together with procedures for making collective decision, are in principle jointly established by local users and government, have achieved only partially the expected outcomes (Borrini-Feyerabend, Pimbert, Farvar, Kothari, & Renard, 2004).

Reciprocal diffidence between indigenous peoples – in whose perception IK is not really valued (and respected) by Westerners – and Western resource managers – who are frequently skeptical about the real knowledge value of IK – has inhibited full commitment to joint endeavors (Hawley, Sherry, & Johnson, 2004).

There are, actually, several serious obstacles to hamper the chance to integrate Western science and IK,<sup>1</sup> for example on the political ground, due to power imbalances of the involved societies, and the colonial framework in which the relationships between indigenous communities and governmental management institutions still occur. There is always the risk that co-management, instead of being a mechanisms for achieving full participation of indigenous peoples in resource management (and then for their self-determination), becomes a means for co-optation of IK (Diver, 2016; Nadasdy, 2003).

Nonetheless, perhaps the hardest difficulties occur on the epistemological ground. In fact, the possibility of a sound integration depends on the possibility of building an overall framework that would be able to recognize, really value and accommodate different, and possible conflicting, interpretations of reality and knowledge criteria (Hawley, Sherry, & Johnson, 2004).

Developing such a framework requires a circumvention of key issues within the Western narrative, such as the rhetoric of progress or the presumption of superiority of Western rationality.

This is an important issue, because the future of human knowledge itself depends on what kind of approach is adopted on this matter. If one thinks, as I do, that cultural and epistemic diversity may be necessary as biodiversity is for nature, and that there is an (unexplored) potential in this diversity, it would then make sense to struggle, even on the epistemological ground, against its transformation into some kind of globalized monoculture, where only a single type of knowledge and science is genuinely recognized as such (see also Shiva, 1993).

Nevertheless, this is precisely what could happen if what is meant by “integrating distinct systems”, such as Western science and IK, becomes the “scientification” of the non-scientific epistemology. Such a way of proceeding risks, in fact, to “sterilize” diversity.

What will be discussed in this paper specifically concerns the relationship between Western science and IK; nonetheless, starting from this, considerations about the future of knowledge will also be provided. It will be argued that taking for granted that the dominance of a particular epistemology and science is the best possible option has consequences on different levels. Not only a multiplicity of different perspectives on reality would be lost; given that knowledge is linked with social practices (including intervention on nature), what is at stake, though indirectly, is the future of our planet too.

## Issues on the Epistemological Ground

How many Western scholars would value IK without lessening it to something merely provided with some empirical significance? Only (Western) science is seen as fully trustworthy, because it provides rigorous, objective and empirically testable knowledge. On the contrary, the reliability of IK is doubtful: it is based mainly on qualitative and subjective observations; it is context-specific,

in the sense that depends on particular local conditions (thus not having a universal purport); it is related to what we usually regard as arbitrary superstitions – an example is the Australian Aboriginal “Dreamtime”, i.e. the corpus of ontological myths that explains past, present, and future (Stanner, 1979) – and often encoded in exotic rituals, which appear incomprehensible to us – as those based on shamanism (Labate & Cavnar, 2014).

However, IK cannot be considered as a simple set of empirical information. Rather, it refers to abstract notions and classifications, which are generally able to provide a systematic account of a biophysical reality (Agrawal, 1995). Dealing with IK implies dealing with different ways of understanding reality, because each society has its own worldview and system of beliefs that define its cultural identity and rationalize its activities (Mazzocchi, 2008). By isolating and decontextualizing bits of information from the overall sociocultural setting, which can be seen as a form of (methodological) reductionism, the full significance of indigenous practices cannot be grasped.

Besides, IK’s “integration” with science in co-management systems frequently involves a validation process that is based exclusively on scientific criteria (especially when IK and Western science diverge, the latter is chosen as the final authority [Nadasdy, 2003]). Only IK corresponding to these criteria (i.e. particular aspects of empirical knowledge) is selected and validated. The rest (usually the worldview or overall belief system, which includes a spiritual aspect too) is refuted as useless or even harmful, because impeding a “rational understanding” of things (Howard & Widdowson, 1996). The risk here is to threaten IK with atomization and fragmentation, together with its alteration – because bits of information have to be re-contextualized within a different conceptual framework (and then “translated” into Western pre-existing categories) – and dispossession (Nakashima & Roué, 2002).

There is a further argument against such a way of proceeding. The fact that one system (IK) is evaluated by the criteria of the competing system (science), implies taking for granted that the latter one is correct or superior. Given science’s impressive track record of success, not many Western people would doubt about such a superiority. On the other hand, how could the superiority of a system over another be “technically” established? We have to refer to some epistemic criteria, but no neutral criteria are given: every judgment would be already conditioned by either the indigenous or the scientific standpoint. There is no other possible choice that referring to the criteria we judge as the most reliable, i.e. our scientific ones. However, to certify the value of a knowledge system through the use of the same system is a form of circular reasoning, in which what has to be demonstrated is instead presupposed (and with the likely result that such a system decides in favor of itself and against its competitor) (Boghossian, 2006; Wright, 2008).

## **Indigenous Worldviews and Practices**

It would be a limit to consider IK only with respect to its successful results at the practical level. IK has been described in terms of a knowledge-practice-belief complex – it is almost impossible to separate the practices from the rest – which has evolved by adaptive processes passing through generations, and concerns the relationships of living beings with each other and with their environment (Berkes, 1999).

What has, therefore, to be considered are also the presuppositions that underlie indigenous practices, something that is related to indigenous peoples’ particular way to understand phenomena and order them within an overall vision.

For example, indigenous cosmologies are not dualistic. In Western modernity, based on Descartes’ distinction between *res cogitans* (psychic reality) and *res extensa* (physical reality), dualism has taken on several forms such as mind-matter or nature-culture. This same dualistic view is also at the roots of many environmental problems.

On one hand, it has instigated the decline of the premodern, organismic view of nature. Also guided by the machine metaphor, the natural environment lost its intrinsic value and becomes an object of exploitation, e.g. a source of potential commodities and a mean to sustain human progress together with continuous economic growth (Merchant, 2003). This is also evident in the notion of “resource” (i.e. something that is available for human use), as well as in the “command-and-control” approach to management, whose aim is usually to make the ecological systems more productive, predictable, and controllable.

On the other hand, this view has also instigated a preservationist thinking that conceives human action only as a possible disturbance factor, and nature as inherently good. The classical idea of naturalness comes, in fact, to be associated to wilderness, something that even reinforces the idea of human-nature separation (Haila, 2000; Mazzocchi, 2016a).<sup>2</sup> Nonetheless, seeing humankind as a disturbance factor, as if it was “external” to nature, is not universal but culturally embedded (Berkes, 1999). It makes sense within a cultural view based on the mind-matter divide, and could be appropriate only for a technological-industrial society (where areas of pure preservation may be needed, for instance as refuges for rare and endangered species).

If the issue lies on how reality is conceptualized, it is at this level that things should be changed. However, the more fundamental the conceptualization, the greater its power, the stronger are its implications on all grounds, and then the harder the difficulty to call it really into question. Descartes’ dualistic view, elevated to a metaphysical postulate, functions as a paradigmatic concept that infiltrates every aspect of our world and life, and can be seen as the hallmark of Western modernity (Dallmayr, 2010).

Conversely, in indigenous worldviews nature and society do not constitute separate domains. Humanity is perceived as part of a web of life, and the relationship between humans and nature is seen as symbiotic: from the natural environment indigenous populations get their subsistence and autonomy, at the same time often contributing to its conservation.

In an indigenous setting, notions such as “wilderness” (or “resource”) does not make sense. On the opposite, the natural environment is seen as “home”. Given that, what really matters is the right way to live in it, and to cooperate for maintaining the overall order. To put it in the words of the Anishinaabe scholar McGregor (2004, pp.389-90),

*The relationship with Creation and its beings was meant to be maintained and enhanced, and the knowledge that would ensure this was passed on for generations over thousands of years. The responsibilities that one would assume would ensure the continuation of Creation (or what academics or scientists might call ‘sustainability’). This knowledge I call Indigenous Knowledge (IK).*

It is especially interesting how IK seems to grasp the complexity of the world, elaborating strategies for coping with it (Berkes & Berkes, 2009). The indigenous universe is usually portrayed as a highly complex and interconnected whole, where all parts are interdependent among each other, and which is made up of constantly forming multidimensional cycles (Freeman, 1992). An intrinsic unpredictability of nature is recognized, as well as the consequent fact that land management has to take place under conditions of uncertainty.

Indigenous holistic understanding of the natural environment, especially in the past, when indigenous peoples were educated in their own languages, cultures and learning methods (and not within Western scientific framework as occurs today),<sup>3</sup> integrates a great many variables qualitatively and considering them over an extended period of time (Mistry & Berardi, 2016).

This could become very important especially in areas that have undergone rapid change, such as the Arctic region, also due to the presence of contaminants. The Inuit, for example, have holistic ways of observing and gauging environmental changes, focusing on specific animals (mostly seals)

and many multiple “indicators” of their health. Making reference to their collective experience over many years, they are able to judge whether an animal is sane or sick and should not be eaten (O’Neil, Elias, & Yassi, 1997).

Although indigenous peoples do not possess the techniques and quantitative tools of Western science, their systems encompasses models of self-sustainability that, in many cases, emerge from a long process of co-evolution between these peoples and their natural environment (Berkes & Turner, 2006), and where the active role that humans can play in helping to preserve the natural setting is emphasized.

Practices and systems are elaborated by which, through collective and adaptive dialogue, communities are expected to be able to respond and adapt to external disturbances, while at the same time maintaining flexibility and an ability to evolve.

The principles underlying indigenous approaches have been compared to the notion of “adaptive management” as developed in scientific ecology (Berkes, Colding, & Folke, 2000), which involves a dynamic and iterative process of social learning from experience, where even policies are regarded as experiments from which to learn. Ecological systems come to be seen as complex and multiequilibrium, and their evolution is seen as basically unpredictable (e.g. Gunderson & Holling, 2001).

To cite an instance, indigenous systems include strategies for preserving what is understood in scientific ecology as resilience (Folke, 2016). These strategies involve human interventions that mimic the function of fine-scale environmental disturbances, for example in supporting the process of ecosystem renewal, and allowing the consequences of perturbations to be circumscribed, reducing the risk of unforeseen large-scale crises (Berkes, Colding, & Folke, 2000).

## **A case study: the Aboriginal fire techniques**

The Aboriginal methods of prescribed burning represent a case history. In Australia their landscape and ecological value is today acknowledged. They have been integrated into National Park policy in specific parts of Australia (e.g. the Kakadu National Park) by means of directives that explicitly make request for their restoration. The Aboriginal fire regimes create landscapes that are ecological mosaics, and are very important to preserve biodiversity; they allow the reproduction of fire-dependent plant species and, by creating buffer zones, the protection of fire-intolerant floristic communities such as monsoon forests. Similar practices are (or were) common in many regions of the world, including several farming systems in Europe (Montiel & Kraus, 2010). By avoiding the growth of shrubs and the afforestation of pastureland, these practices preserve the overall quality of forage resources and, by avoiding the accumulation of highly combustible phytomass, they function as fire prevention tools too.

However, especially the Kakadu National Park case, where White Australians and Aborigines are somehow both involved in management, shows the difficulties in adopting IK, which become manifest at different levels, as reflecting the deep differences between the two cultures involved.

First, with respect to fire conception and its management. In Aborigines’ view, Westerners are “afraid of burning at the right rimes”. In park personnel’s view, instead, Aboriginal burning practices are haphazard and carried out on an “*ad hoc* basis”; they do not follow ecological reasons, with the risk to endanger the fragile habitats (e.g. floodplains and paperback swamps) (Lewis, 1989).

However, Aborigines seem to have perception of the complex ecological processes that relate and integrated different areas, and the multiple systems of cause-effect relationships involved. They recognize the important role played by fire in affecting such an integration, as well as the distribution and relative abundance of flora and fauna species. Actually, their fire practices are anything but random. Rather, they are an interesting example of IK’s ability to understand the complexity of nature. Aborigines take into consideration the habitat types involved, which are



exploited to varying degrees and fire managed in different ways, depending upon ecosystems characteristics and accessibility, together with their significance to Aboriginal needs and ritual patterns (rainforests and paperbark swamps are, for example, safeguarded against firestorms that can be set on nearby areas (Lewis, 1989).

The differences between Western and Aboriginal cultures are reflected in fire conception itself. On one hand, Western managers and Aborigines are usually in agreement in seeing fire as a natural feature of ecosystems, and as important for habitat preservation; on the other hand, whereas park managers are interested in “controlled burns”, to be planned in advance and following scientific criteria, assuming that “basically fire is bad but *can be used* to good purpose”, Aborigines possess techniques that are still based on many rules of thumb and believe that “fire is good and *must be used*” (Lewis, 1989, p.955), at times under conditions that may appear extreme to Westerners.

Second, conflicting views exist between Westerners and Aborigines with respect to people’s relationship to land and biodiversity conservation. As noted by Andersen (1999), this becomes evident when management objectives are established. Even when two objectives seem, *prima facie*, congruous, at a closer scrutiny they result to be competing, as occurs in the Kakadu National Park with the two “twin” objectives of promoting Aboriginal burning practices and biodiversity conservation (Kakadu Board of Management and Australian Nature Conservation Agency, 1996). In fact, what is meant here by “biodiversity conservation”, and who is in charge of deciding it? One may be interested in preserving biodiversity patterns as reflecting the state of the environment that prevailed before the European settlement, with the inclusion of a significant amount of grass pasture in many natural areas as due to Aboriginal fire regimes (here biodiversity conservation would not be in contrast with a sustainable use of the land, and then Aboriginal practices). Otherwise, one may be interested in restoring patterns that were supposed to exist in the pre-Aboriginal environment, assuming that traditional repeated fires are an impediment to the vegetation cover for improving towards the arboreal stage. For example, it may be posited that eucalyptus forest is the natural condition in Australia, implying that every tree has to be protected (see also Gammage, 2011). This would be bring us closer to the idea of wilderness, setting the land aside for preservation reasons, with the risk to impose on Aboriginal peoples our dualistically-based idea of conservation, and to alienate them from their land and responsibility.

Third, there is an underlying issue concerning the coming across of different knowledge systems and worldviews. The superiority of scientific explanation over indigenous one is assumed by most park rangers, irrespective of the fact that Aboriginal knowledge has ensured long-term stewardship. This is, obviously, only a “local” example of the difficulties that members from “advanced” societies have in accepting the possibility that there could be some to be learned from “primitive” societies, which have, in their view, only rudimentary knowledges and technologies.

Given that, it is not easy to go beyond a benevolent but yet “paternalistic” relationship with Aborigines. Not surprisingly, most park personnel believe that Aborigines (nonscientific) burning practices should be “ruled” by some form of restrictions or supervision, and it is not uncommon that Aborigines are admonished for burning at the wrong time or in wrong areas (Lewis, 1989).

Westerners have also troubles in understanding the emotional and ethical, or even aesthetical, concerns that Aborigines have with regard to the uses of fire, which is part of their idea of taking care of their own land-home. This idea could take the form of “cleaning” the environment, for example resetting fire in “neglected”, thick stands of vegetation. On the other hand, this same activity is also linked to the possibility of preventing fuel accumulation, something that is essential, as Westerners also recognize, to avoid more destructive fires.

The adoption of Aboriginal techniques has indeed involved the transfer of (some empirical) knowledge from one culture to another, under a very different (e.g. socio-economic, political and cultural) setting. It has been based on a process of selecting/decontextualizing/recontextualizing bits of knowledge, because it is only admitted that “elements of traditional uses of fire” might be

employed as a part of the Kakadu fire management program (Australian National Parks and Wildlife Service, 1980, p.177). The underlying knowledge Aboriginal culture is grounded in, which includes the already mentioned “Dreamtime”, and the Aboriginal system of values are rarely, if ever, taken into consideration or rebutted as pointless. The framework of management is fixed by scientific (or other Western-based) standards. In order to be “validated” Aboriginal practices should be able at some extent to match these standards, but the problem here is precisely to expect that Aboriginal knowledge could be legitimated through a Western system of justifying knowledge. Given these circumstances, it would be unrealistic to expect a thorough application of these practices or that they are fully grasped when adopted or integrated into policy by Western managers. What would be really needed is a conscious effort to learn “*from* Aborigines”, rather than merely “*about* Aborigines” (Lewis, 1989, p.958), otherwise any acknowledgement of their value or understanding of their meaning can only remain on the surface.

## **Epistemic Diversity and the Future of Knowledge**

The topic discussed here, which concerns the relation and possibility of integration between Western science and IK, is also relevant for pondering about the future of human knowledge.

Our images of the future are, in fact, strictly related to the question of knowledge-power, because often such images are used to legitimize situations that, although they appear admittedly problematic in the present (e.g. they contain social inequalities), they are also seen as a necessary sacrifice for creating a better future, something that is often represented in terms of a progress or improved rationalization. As argued by Polak (1973), images of the future are important because their organizing power pulls people toward them, and as such they contribute to establish the sense of a privileged society, culture and knowledge system, towards which humanity as a whole should tend. This is also reinforced by the fact that the future itself is, at times, represented in deterministic ways. As a consequence, there is the need to develop an alternative, and plural vision of the future or, as argued by Dator (2005), to “de-colonize” the future, recognizing both the unpredictability of nature and the role of human agency, which includes creativity and the possibility of paradigm shifts.

The notion of “ecology of temporalities” as developed by Santos goes in this direction too, and challenges the “monoculture of linear time, the idea that history has a unique and well known meaning and direction” (Santos, 2006a, p.16).

Any vision of time is embedded in some cultural view and cosmology, and Santos’ ecology of temporalities makes sense of the fact that a plurality of visions exists; that linear time is only one idea among many others, just like the notion of circular time is another one; even notion that may appear nonsense to us, like those based on the relevance of ancestry, are not necessarily an expression of the backwardness of peoples employing them, but rather of a different way of understanding the world.<sup>4</sup>

The core argument of many seminal works in future studies research, including Santos’ ones, is that there could be genuinely alternative visions of the future only whether there are genuinely different knowledge systems. In this sense, the ecology of temporalities is strictly linked to the notion of “ecology of knowledges” (Santos, 2006b; 2014), which is based on the recognition, often denied, that the cultural diversity existing in the world corresponds to a genuine epistemic diversity.

Taking on this notion or stance would be vital to avoid further “epistemicide”, as Santos (2014) called it, i.e. the erosion of a millennial inheritance of cognitive routes and experiences (but also spiritual and aesthetic traditions). The ecology of knowledges does not, of course, have as a prerequisite to bring discredit on scientific knowledge (or the Western idea of rationality), but only on its hegemonic use. What has, in fact, to be sought is a novel way to approach epistemology,

something that would be able to account and valorize the existence of different knowledge traditions.

There have been contributions that somewhat go in this direction in the philosophical field. For example, the approach of “ethnoepistemology” (Maffie, 2013), which refuses the “double standard” according to which only the epistemological activities of Western thinkers should be characterized as epistemology proper, while those of non-Western thinkers should be marginalized as mere anthropological curiosity; or the writings of the feminist philosopher Harding, who believes that sciences and cultures “coconstitute” one another, and has argued in favour of a more multicultural science (Figuroa & Harding, 2003). Feyerabend (1987; 1999) has, on his part, talked extensively about the world’s richness and variety (or “abundance”), arguing that it is impossible to capture its complexity in a single conception or conceptualization. He has also pointed out that science should not be used as a frame of reference for evaluating other ways of investigating the world. Not only many other cultural knowledge traditions exist, but they have also been “successful” enough in their interaction with nature to enable the peoples referring to them “to live a moderately rich and fulfilling life” (Feyerabend, 1999, p.195). Even non-scientific notions receive “a response from Nature” (ibid.), precisely because nature is far more complex than “a belief in the (...) unique excellence of science would suggest” (ibid.).

A situated and pluralist account of knowledge (and “reality”) has been made intelligible even within the context of contemporary science. Second order cybernetics (von Foerster, 1982), autopoiesis theory (Maturana & Varela, 1980) and the epistemology of complexity (Morin, 1986) have highlighted the importance of taking into account the role of the observer in scientific investigation (and even beyond). An observer describes the world from the inside, being confined in her/his situated cognitive domain, and consequently does not probe reality in an unbiased manner. The “constructivism” implied here has attracted interest from future studies specialists too, who come to recognize that “objective knowledge is impossible” and that “the researcher is always a part of the world he or she studies” (Reason & Bradbury, 2001, p.6).

Not only such an approach promotes the relinquish of the ideal of neutral observer, but it also advocates the related need to adopt multiple viewpoints and levels of understanding. In fact, multiple different (scientific) ways of investigating and interacting with a system may be needed (Mazzocchi, 2016b). And yet a similar tenet may be even extended for endorsing a culturally based knowledge pluralism:

*That the world should have this plastic texture, neither subjective nor objective, not one and separable, neither two and inseparable, is fascinating. (...) It reveals to us a world where ‘no-ground’, ‘no-foundation’ can become the basis for understanding that the age-old ideal of objectivity and communication as progressive elimination of error for gradual attunement is, by its own scientific standards, a chimera. We should do better to fully accept the notoriously different and more difficult situation of existing in a world where no one in particular can have a claim to better understanding in a universal sense (Varela, 1984, p.322).*

In his appeal for an ecology of knowledges, Santos (2006b) indicates a further motivation for valuing knowledge pluralism: different types of knowledge make possible (or prevent) different types of interventions on the world. Western science is praised because it confers us a great (and unprecedented) ability to intervene on the natural world and transform it by technological means. Nevertheless, even science has its own limits, and also for this reason we should be interested in the range of possibilities offered by other forms of knowledge. An example is the safeguarding of biodiversity based on indigenous knowledge, something that is at risk of vanishing if it continues to be replaced by (often failing) science-driven operations.



The multiplicity of different cultures and knowledge systems has brought about different ways to make the world meaningful and different models of human-nature interaction. It is unlikely that all systems (or practices) possess an equal value or significance. However, it is very challenging to establish comparatively their epistemic value without incurring in epistemic circular criteria, an issue that cannot be easily overcome. On the other hand, not only there are reasons, at the local level, to value many IK systems, i.e. because they confer adaptive ability (and then long-term sustainment) on the society that adopt them, there could be “practical” reasons, even at the “global” level, that suggest us to maintain this diversity.

Perhaps, many or all the bodies of knowledge existing in the world could have a role to play for the construction of the future. Perhaps, a system should not be judged with respect to some *a priori* criteria, but more pragmatically with respect to its effectiveness for achieving some purposes (and this would also require that these purposes reflect the values and needs of the peoples whose life is likely to be affected by their accomplishment).

Cultural and epistemic diversity may be necessary as biodiversity is for nature (Shiva, 1993). Such a diversity is the common heritage of humanity, and constitutes a potential source of creativity and reserve of cognitive tools for the future.

## **Towards a shared knowledge production?**

In previous works (Mazzocchi, 2006; 2016b), I have argued that each (cultural or epistemic) standpoint opens a gateway to the (description of) reality, and yet it closes at the same time other possible descriptions: in order to see something, something else must necessarily be excluded from the vision. Hence, what appears to us as reality – “our” reality – and the knowledge we have of it are always the result of a filtering process that takes place at different levels (this is an argument advanced, of course, by various thinkers like Gadamer (1976) in contemporary hermeneutics with the notion of “horizon”, i.e. the range of vision that encompasses everything that can be seen from a particular vantage point, and Foucault (1992) in post-structuralism with the notion of “episteme”, i.e. the knowledge boundaries that frame our knowing).

This awareness of knowing partially (which implies a sort of Socratic element, i.e. the knowing of not knowing) may help us to more clearly delineate the boundaries of our cognitive world (that form our identity in a complex world of multiple identities). On the other hand, our (experiential and conceptual) cognitive space could always be expanded. At times, this requires the ability to shift our viewpoints, something that could be triggered by coming into contact with the tenets of a foreign culture. In principle, there is no real limit to the unexplored insights and conceptualizations that can be discovered, plus new knowledge can always be produced by bricolage.

A future research method that can be very useful here is Inayatullah’s (1998; 2007) Causal Layered Analysis (CLA). Its value lies not in predicting the future, but rather in creating transformative spaces for allowing the creation of alternative futures. This method consists of multiple levels of analysis, by investigating different levels of “reality” and assumptions, from the empirical to the cultural one, continuing towards discourses/worldviews and finally approaching the level of metaphor or myth. In this way, research is allowed to move up and down of them, with the purpose of including different ways of knowing and fostering the development of more holistic policies.

The last two layers of analysis, i.e. discourses/worldviews and the level of metaphor or myth, have a special importance, since they contribute to shape the deeper roots of each society. However, this is precisely what is today not taken into consideration in the attempts to combine or integrate Western science and IK.

As repeatedly said, what looks like mere environmental actions or practices are grounded in deeper levels of assumptions. It may be even possible to obtain some valuable outcomes by only

working on the empirical level, but what remains fully unsolved is the underlying issue concerning the coming across of profoundly different ways of life (both circumstances are well illustrated by the Australian case described before).

The Western society is grounded in the Ancient Greek Logos and, in its attempt to be enfranchised from irrationalism and myth, historically evolved towards the elaboration of the scientific experimental method, together with the enlightenment ideals of rationality. Today science plays a key role in creating authoritative discourses, defining the space of intelligibility (i.e. framing what is knowable and what is not). In the end, it is this trajectory of the Western modernity, based on the idea of progress, to challenge the possibility for a real appreciation of IK, which is too similar to something that belongs to the ancient past of our tradition.

However, each society and culture, even the “advanced” ones, has its own metaphors and “myths”, which include

*(...) the deep stories, the collective archetypes, the unconscious, often emotive, dimensions of the problem or the paradox (...) This is ‘the root level of questioning’ (Inayatullah, 2007).*

In order to create the possibility of alternative futures, it is essential to deconstruct leading metaphors and key thoughts. Alternative ways of knowing, such as the indigenous one, can act as “decentering forces” to create a “distance” from (our) present and categories of thought, which in the Western case include reductionist metaphors (e.g. the “world machine” metaphor), dualistic notions of naturalness, and a linear, progressive view of time (in which the future is seen as the “surpassing” of the past).

By attempting to identify which discourses have been hegemonic, and by distancing also through making use of scenarios – here meant as images of the “possible” that challenge the present, that make it “remarkable”, allowing alternative futures to emerge – we can come to denaturalize the present order. We make manifest its situatedness, i.e. its reflecting a particular historical moment, and the precepts of a specific civilization. This would create better conditions to learn how to switch between different kinds of intelligibility, going beyond the Western ideals for that.

Such an aptitude, which includes becoming aware of the incompleteness of one’s own knowledge, could also be found in Santos’ writings, where it poses the basis for “intercultural translation”, one of the core ideas of his “epistemologies of the South” (2014). This intercultural translation consists in

*searching for isomorphic concerns and underlying assumptions among cultures, identifying differences and similarities, and developing, whenever appropriate, new hybrid forms of cultural understanding and intercommunication that may be useful in favouring interactions (Santos, 2016, p.22).*

Yet we have seen how the encounter between different societies and their respective bodies of knowledge does not take place on an equal footing, but rather in a setting that is populated by hegemonic notions and models (e.g. of what rationality or productivity means). This circumstance has consequences on how the integration or hybridization between different systems is conceived. As argued by Santos (2016, p.27), there is always the risk that “alternative” knowledges come to be transformed into “raw materials [to be processed] for the production of scientific knowledge”, thus involving a form of “cognitive extraction” that bears a resemblance to the material extraction of natural resources.

Very often processes of “integration” or cross-cultural hybridization are based on the combination of bits (indigenous) of knowledge or cultural items – which are extracted from the overall framework they belong to and in which they have evolved – with another knowledge system,

i.e. science, taken as a whole. Rather than creating novel forms, these processes risk sterilizing diversity, as far as non-scientific knowledges like IK come to be more or less “scientificated”.

That is why, Santos (2016) argues in favour of the creation of “non-extractive methods” (p.27), in order to allow the achievement of what he calls a “de-colonial form of hybridity” (p.25). His method of intercultural translation has been elaborated for helping to bring together different knowledge systems, also with the purpose of a shared production of knowledge, yet avoiding to threaten their specificity (something that, as Santos himself has to recognize, is not easy to reach).

What could be added to this? Perhaps the very simply observation that as long as the purpose of translation is bridging different (cultural, linguistic and conceptual) “worlds“, at its foundation lies the existence of a “space of distinction” (between these worlds). Such a space is something that, to a certain extent, has to be maintained. The conditions for a genuine intercultural dialogue and translation are given, in fact, only when distinct “identities” exist, interact, and are engaged in finding a negotiation of meanings. This may be, however, a knotty process, which requires several translation compromises, and to cope with the existence of the “untranslatable” from one setting to another.

## Conclusion

Integrating Western science and IK is not an easy task, because it has to challenge the difficulties of considering different (culturally biased) horizons of meaning and ways of life. Many issues oppose to the possibility of such an integration. However, together with their differences, also commonalities between Western science and IK should be taken into consideration. In fact, at the most basic level, they are both an expression of a common (human) nature, for example a common disposition to language, and refer to the same underlying reality, even if they occupy different (cognitive) “niches”.

Although embracing different perspectives, there is still the possibility to relate each other, mutually learn, and discover or develop shared meanings (Mazzocchi, 2006). Given certain conditions, they might, at least in principle, “complement” each other, in the sense that they can show something that is beyond the reach of the other perspective.

This would require to build a framework where, without succumbing to relativism, the value of knowledge pluralism is fully recognized: here “integration” (if we want to keep this word, but other terms would be better, such as “bridging”) would not be conceived as the melding of different items into one “unified” system (Mistry & Berardi, 2016) – by encouraging IK to become “more scientific” – but as the respectful and pragmatically meaningful “linking together” of systems that maintain their “fertility” and distinctiveness: the two bodies of knowledge, whose legitimacy in their own contexts is recognized, should then be pursued “separately but in parallel” (Berkes, 1999, p.270), maintaining the possibility of interacting and enriching one another as needed. At times, this could also trigger processes of cross-cultural hybridization.

Taking such a stance could play a role with respect to the kind of future we want to envision for human knowledge. Against the risk of sliding, without being too much aware of it, towards a globalized monoculture, i.e. a hegemonic future in the name of progress, we can instead create the possibilities for a genuine ecology of knowledges. Multiple different conceptions of knowledge, models of interaction with nature, and conceptions of time (and space) can be brought together, and from their complex interactions we can learn something new. As such, the future of knowledge would be a story yet to be written.

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## Endnotes

1. In this article I will use the terms “Western science” and “indigenous knowledge” as commonly intended. As an anonymous reviewer pointed out, it should however be beard in mind that, despite West’s claims for having originated science, its earliest developments were due to the East as well. Besides, science has today become “global”, and it would be better to delocalize it, instead of seen it as the preserve of the West. On the other hand, in talking about “Western” science I am referring to it as a “paradigm” of the modernity, which is historically based on Western thought, especially owing to the key contributions of Descartes, Galileo, Newton and Laplace. It is also strictly linked to industrialization and the idea of progress, which would be ensured by the technological domination of the planet. This paradigm, which is also rooted on Descartes’ dualism, can be accounted in terms of its key patterns or principles, such as “reductionism” – i.e. any system or phenomenon can and should be explained by reducing it to simpler items (or its parts) – “determinism” – i.e. all events are determined by previously existing causes to which they are bound by a relation of necessity, and there is only one possible future – and “objectivism” – i.e. (scientific) knowledge is able to provide a truthful and objective representation of the external world. The term “indigenous” points basically to the autochthonous character of IK. However, it is not univocally interpreted, and risks to exclude knowledge produced by peoples that are not usually recognized as indigenous, like local farmers and fishers. Besides, the use of a single term also risks to be misleading, as it reflects the tendency to present IK as a unitary body, neglecting the fact that, apart from some shared general features, IK encompasses a variety of different forms and structures.
2. An important role in the critique of the nature/culture (and subject/object) divide has been, of course, also played by feminist epistemologies (Haraway, 1992; Harding, 1986; Keller, 1985).
3. Often indigenous peoples have to spend time to deconstruct what has been imposed on them by colonizers (e.g. views and labels), getting in touch once again with the deeper level of their traditions (supposing that they have not been destroyed) (McGregor, 2004).
4. In contrast with the monoculture of linear time, Santos’ ecology of temporalities brings also about a multifaceted notion according to which “the subjectivity or identity of a person or social group is a constellation of different times and temporalities, some modern, some non-modern, some ancient, some recent, which are activated differently in different contexts or situations” (Santos, 2006a, p.22).

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