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Building the bioethics tools of a community council to the future: the ecosystemic gap

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These are times of crisis. Recently, the COVID-19 pandemic and the resurgence of a form of Cold War raised international concerns about Health & Well-Being, Climate & Biodiversity, and Technology & Economy. Articulating bridges between disciplines, between cultures and between knowledges has never been more urgent to accelerate the translation of values and policies into actions. This comprehensive review argues for a radical ecosystemic approach to bridge the Medical & Environmental fields (studies, sectors, and technics) in an integrated management practice of Care, Production & Biodiversity. As bridging implies solving the epistemological gap, the argument emphasizes the need to raise awareness with theoretical hybridizations, fieldwork hypotheses, and working theories. According to Van Rensselaer Potter, who coined the term 'bioethics', awareness means to refocus the Medical & Environmental studies and surveillance processes from a target (e.g., the disease, the pathogen, or the resource) to its context (e.g., adding history, demography and ecology). Thus reframed, concerned researchers, leaders, and citizens should invest their effort in preparing the (contextual) terrain for ever-more organizational resilience. We conclude on the need for actions to shape the Health & Biodiversity determinants, to improve communication systems, data-sharing networks, and responsible innovations, and to foster knowledge translation to envision a better realistic future.

"Ecology's uneconomic, but with another kind of logic economy's unecologic" (Potter 1988, p.9)

Introduction

We are in a time of crisis: the emergence of pandemic agents, loss of biodiversity, climate change, geopolitical conflicts, etc. Recently, the COVID-19 pandemic and the resurgence of a form of Cold War spread large in international discussions (Valdés and Rendtorff, 2021; Diaz-Castro et al., 2023). Those raise several concerns on Health (see the Manhattan 2004 to Berlin 2019 Principles), Climate (see the 2022 Conference of Parties 27 in Egypt) and Biodiversity (see the 2022 COP15 in Kunming-Montreal). Moreover, these concerns complexify and intensify when intertwined with Technology (see the Joint Partnership on Artificial Intelligence) and the Economy (the 2022 Group 20 in Indonesia). For the biologist Van

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Rensselaer Potter (1911–2001), the one who coined the term ‘bioethics’ between 1964 and 1971 (Potter, 1971), this ‘global’ crisis is ongoing since the beginning of humanity, as humans must adapt, even learn and equip themselves, to survive (Potter, 1988)¹. However, since the last century, Western scholars have realized environmental crises deserve our attention: the environment affects our—as individuals—state of health and our—as Society—vision of the future (Potter, 1971). To do so, we must increase the awareness of the surrounding space (our environment, context and standpoint), as set in the *Canadian Journal of Bioethics* in terms of ecological (e.g., biology, geology, and chemistry), social (e.g., politics, economics, and culture), and intellectual (e.g., literature, education, and critical thinking) environment (Boudreau LeBlanc, 2023)². Juggling this ‘environmental’ polysemy can quickly become complicated, even becoming a slippery slope leading to the oblivion of protecting wildlife and social services for building ever-more (infra)structures³. Nonetheless, being aware of the environment does not mean transforming the surrounding milieu into a humanly attractive (i.e., useful, productive, aesthetic, etc.) order, as already coined by Aldo Leopold (1887–1948; Potter, 1988; Boudreau LeBlanc, 2023) early in the 20th century on the control over the land (stewardship) vs the cooperation within/with the land (Potter, 1988; Leopold, 1949).

At first glance, ecological, social, and intellectual environments seem unconnected or unconnectable. But the Philosophy of Science identifies a subtle relationship (an interdependence)⁴. Due to the *cognitive* and *behaviors*, individuals are capable of social changes and then scaling an idea emerging from their mind (the intellectual organization) up to a collective set of actors (the social organization) and systematically act on their surroundings, which over time will transform their biotic community (the ecological organization) (Boudreau LeBlanc, 2023). However, to organizationally scaled up an idea, one individual has to envision an engaging future (i.e., having a vision) to enrol peers in the effort for collective change (i.e., for leadership, (Roger, 2003). According to Potter, these *willing* individuals are engaged scientists, concerned citizens, and—fundamentally—‘fieldwork bioethicists’⁵. In this argument, we use the ecosystemic approach to highlight this interdependence (Dawes et al., 2016; Jonak et al., 2016)⁶ and explore ways to manage the (epistemological) risk of interdisciplinary translation. For instance, the political overuse of ‘ecosystem’ tends to reduce the theoretical basis of ecology (a natural science) to a social (even activist) position strictly concerned with non-human beings and things (Boudreau LeBlanc et al., 2021a; Zhu, 2012). Consequently, it is challenging to recognize social and political issues as embedded in the ecological environment⁷. Accordingly, the term ‘ecosystemic’, popularized by the Earth Summits (see the United Nations UN, 1992), has radiated in several sectors without fully acknowledging the strong interdependence between, among others, ecology, management (Epstein, 2016) and health (Forget and Lebel, 2001). This approach is promoted in the literature on Sustainability and aims, at first glance, to reconcile environmental, financial and cultural interests. Henceforth, a minor link remains between the ‘ecosystemic’ approach (a metaphor) and physical ecosystems (a model), which can be a strength (Pickett and Cadenasso, 2002), but a slippery slope at the same time (Wylie, 1982).

According to Wahl-Jorgensen (2016), the ecosystemic approach relates to Chicago School history, known for its application of the ecological model in criminology. Studying digital environments, Jonak et al. (2016) sophisticate the metaphor to understand the social processes, scales and (macro) organization of Science, Technology & Society using the Darwinian conceptual framework (adaptability, evolution, plasticity, community, etc.). In *Philosophy of Sustainability*, Norton (2005) reminds Charles

Darwin’s (1809–1882; Darwin, 1859) call for a new field of study: the ‘Economy of Nature’, coined later as ‘Ecology’⁸. Suppose these metaphorical relationships are creatively constructive, as Thomas Malthus (1766–1834)’s model inspired Darwin to explain the (ecological) population’s exponential growth. But they can become a slippery slope leading to injustice, as the reductive Malthusian (social) conclusion of having a birth control policy, which applies to the impoverished of society to control population growth⁹.

This paper argues for deepening the epistemology of the ecosystemic approach to bridge the Medical & Environmental fields (studies, sectors, and technics) in an integrated management practice of Care, Production & Biodiversity. To address this radical (epistemological) gap, the argument navigates through the History of Ecology & Sociology before deepening its Philosophy or Science foundation in light of the Potterian and Leopoldian views on the Biology & Ethics bridging values. These two authors are pioneers of new techniques, including the community-based adaptive ecosystem(ic) management (or co-management) approach (Norton, 2005), and open a new path for operationalizing Global Bioethics.

Theoretical hybridization

Ecology has inspired and been enriched by many fields of knowledge¹⁰. For instance, the Chicago School emerges in sociology at the time Arthur Tansley (1871–1955, 1935), who coins the term ‘ecosystem’ in plant ecology. Accordingly, the two distinctive perspectives have co-evolved on the topic of ‘urban ecology’ since then. The Baltimore School, introduced by Steward Pickett et al. (1985; 2011), formalizes ecosystem ecology in urban studies. Pickett’s ecological view is mathematical; it focuses on the phenomenon of biogeochemical cycles and the biochemical mechanisms of thermodynamics (Pickett and Cadenasso, 2002; Pickett and Grove, 2009). Conversely, the ecological view of the Chicago School is socio-political. It focuses on sociology, notably the system of discourses and power dynamics, and more precisely on groups embedded in a psychological, economic and cultural context (e.g., factors of influence). While attempts to reconcile these three perspectives of Urban Ecology are underway (Jonak et al., 2016; Wahl-Jorgensen, 2016; Rademacher et al., 2019; Stone-Jovicich, 2015; Dwiartama and Rosin, 2014; Lave, 2015), a critical work remains to orient this translation, dialogue, and—to some extent—theoretical learning and interdisciplinary hybridization. And it is at this stage of the reflection that bioethics became relevant to open the dialogue on uncertainties and prevent the risk of disciplinary reductionism (Callahan, 1973); sometimes caused by institutional conflicts of interests (Olivier and Williams-Jones, 2014) and (intellectual) power dynamics from hegemonical over more silent disciplines (Beever and Morar, 2019); other times caused by a misunderstanding of the scope and reasoning of the discipline of our colleagues, for instance, oncology and ethics (Potter, 1971), wildlife management and ethics (Potter, 1988), medicine and ecology (Beever and Morar, 2019), medicine and philosophy (Ferrarello, 2023). Framing these interdisciplinary translations is essential to ensure technical advances without introducing confusion in each field¹¹. All three have distinct criteria to value knowledge (e.g., axiological and epistemological) and must operate interdependently (or co-operate). Each field prioritizes different paths to learning and access to knowledge differently due to its respective value, which pulses its meaning, purpose, and sense¹².

The ecosystemic approach involves system thinking. The logic of system thinking is part of the Complex Theory philosophy. It means making sense of the world through element networks (relationships) and organizational functioning (phenomena),

instead of the elementary study of the parts or the whole. Under this perspective, intervention is no longer a punctual action conducted on a targeted issue for a particular end (i.e., a linear problem-solving logic). Consequently, health and environment interventions must pursue a more adaptive, learning, and reflexive reasoning. Elinor Ostrom (1933–2012) explains human systems through collective norms (2000), which go beyond interpersonal relationships and includes intergenerational learnings (Henrich and Muthukrishna, 2023) and a human inter-species sense of responsibility (ten Have, 2011). In the same line of thought, the sociological model of Ernest Burgess (1886–1966, see Swannack and Grant, 2008)—later used by Eugene Odum (1913–2002) in ecosystem ecology¹³—is helpful to unpack the meaning of systems, of collectives and of communities (see Leopold on the ‘biotic community’, Dawes et al., 2016; Wylie, 1982; Wahl-Jorgensen, 2016). Burgess and Odum organize concentrically knowledge: the system (a meso-structure) embeds individuals; the cognitive (micro) is nested in a large set of collective-network (the system); while all interact organizationally (macro) with the environment. Bruno Latour (1947–2022) uses an analogous knowledge architecture in sociology. His theory on actors, networks, and translation advances this perspective on complexity – even unpacks its application on the social (Latour, 2007; Bilodeau and Potvin, 2018; De Munck, 2017). Henceforth, Anne Rademacher et al. (2015), highlight the need for methodological bridges in the practice milieu: “The work of assembling robust ethnographic and clearly historicized portraits of urban socio-natural transformation, and of reaching beyond the laboratory [...] is notably scarce”. To ease this bridging process, we need methods to materialize the (macro-organizational) ‘dialogue’ among scholars and, historically, between societies, generations, and (abstractly) lands. We need a ‘translation process’ (Callon et al., 2001), even a ‘hybrid forum’ or ‘hybrid community’, as coined by Michel Callon (see Appendix 1; 2004),¹⁴ or a multispecies ethnography, as outlined by Rademacher et al. (2019), to building a shared sense (i.e., values) of a better future (Potter, 1971) from the in situ experience of experts and local inhabitants. Consistent with his iconic prose, Leopold calls for a method that *Sketches here and there* to contextualize interventions within their milieu and for their inhabitants: he calls for a collective communitarian ethics that he labels *The Land Ethic* (1949).

Values and sciences are inseparable in dealing with the uncertainty surrounding complex knowledge and decisions (Metzger and Salmond, 2008; Douglas, 2007; Funtowicz and Ravetz, 2008; Norton, 2008). Dominique Charron, who advanced the ecosystem approach to human health (ecohealth), reminds us: “Ethical dilemmas should be expected by [and studied by] researchers who anticipate them and take them into account in advance are sometimes better prepared to deal with them” (2014). Edgar Morin and scholars in bioethics (1992; de Langavant, 2001; Wilson, 2014; Maldonado and Garzón, 2022; Chursinova et al., 2022) use the complexity perspective in Philosophy or Science to reframe multilemmas opposing individuals with the collective. Ethics is about values; it refers to the studies of its reasoning, its distributions in Society, and its use by people to deal with complicated choices (dilemmas) (Potter, 1972). This new way of doing, where sciences and values are intertwined, echoes (Funtowicz and Ravetz, 1993) philosophy of *Post-Normal Sciences*. This philosophy builds on the elementary work of Thomas Kuhn (1922–1996) on the *Structure of the Evolution of [Normal] Sciences* (1962). Funtowicz and Ravetz advance a new logic for *in-action* and *in-situ* sciences—when knowledge makes its “entrance into society”. Kuhn’s ‘normal’ disciplines point to the kind of sciences that is conducted inside the ‘laboratory’ (see also Potter, 1964). Adding ethics in situ of science functioning is arguably the missing piece to advance knowledge outside the laboratory¹⁵.

Charron poses some limits to *in-action* sciences, as coined by Latour (1987): “Research may not be the way to bring about the changes that communities expect” and this requires a necessary resignation of researchers about their interest and goal: “which is, of course, not desirable for any project” (Charron, 2014). Thus, the *in-action* requires discipline (literally) and framing the conduct of researchers and responsible innovation in sciences. Research techniques must innovate to be helpful to the community. However, constructing knowledge with communities, known as co-construction, adds epistemological complexity. As Peter and Catherine Whitehouse (2020) suggested, *Post-Normal Sciences*, *Transdisciplinary Perspective*, and *Action-Research Methodologies* make sense (epistemologically) in light of the Potterian view of bioethics. *In-action* sciences and ethics require documentation, monitoring, and a (multisite) management process conducted at local scales—thus acknowledging specific challenges—but guide in light of general knowledge to foresee more globally (Boudreau LeBlanc et al., 2022a). Science, not only research, should evolve through experimentalism, which means investing in the governance of innovation, managing the trajectory of discoveries and prioritizing scientific *quests*—practical and technological as well as applied and fundamental—by adaptive logic based on bioethical discussions. Science must open up to “a wider range of strategies that go beyond communities to influence the system where deeper and longer-term change is possible” (Charron, 2014). But which *Council on the Future* must guide the way?

Building awareness of the context

Under the term ‘bioethics’, Potter advances the philosophy of Leopold. Indeed, bioethics must be “buil[t] on the Legacy of Leopold”. Although Potter has focused his scientific work on oncology and his ethical reflections on policies and technologies, their conceptual framework converges through biological, even ecological metaphors. They argue for bridging the *social* and *ecological* dimensions in a global system contextualizing the daily life of individuals and the community¹⁶.

Figure 1 introduces some concepts of Leopold’s theoretical framework on the biotic community and ecological landscapes¹⁷. Some scholars outline that the thesis of Potter is “the story of a lost battle” (Potter, 2011; Durand, 2005), but we disagree here. The *battle*—we should emphasize the intellectual debate on complexity (de Langavant, 2001; Wilson, 2014; Maldonado and Garzón, 2022)—starts way before Leopold, transcends its biography, and even Potter’s work. And the story is about applying pragmatism in ethics (Norton, 2005; ten Have, 2012) and the Philosophy of complexity to Society, starting with medical and environmental practices. Hence, Potter does not conceive bioethics as a new “topic” of study (Durand, 2005): an ethics applied to health, life (*bio-*) and the environment. Instead, he conceives bioethics as a new set of “post-normal science” methodologies and pathways.

Potter 1988 schematization aims at identifying the pathway (**arrows**) to operate global bioethics. Conceptually, Potter frames bioethics in terms of a ‘Global’ (Potter and Lisa, 2001) ‘Acceptable’ (Potter, 1992) ‘Survival’ in light of the individuals, their society (human), the (biotic) community, and the Land (Fig. 1). Bioethics must operate, he explained, as a ‘Council on the Future’ (Hottois, 2011)¹⁸. In 1964, he emphasized the function of Sciences as a powerful way to inform Policy. Not only a set of knowledge, Science appears to him as a social collective of experts, measures, surveys, criteria, concepts, theories, etc., while Policy is a social collective of persons, artefacts and laws with their own concepts and theories; and both collective are made of cultures, beliefs, controversies, etc. Still, he acknowledged that

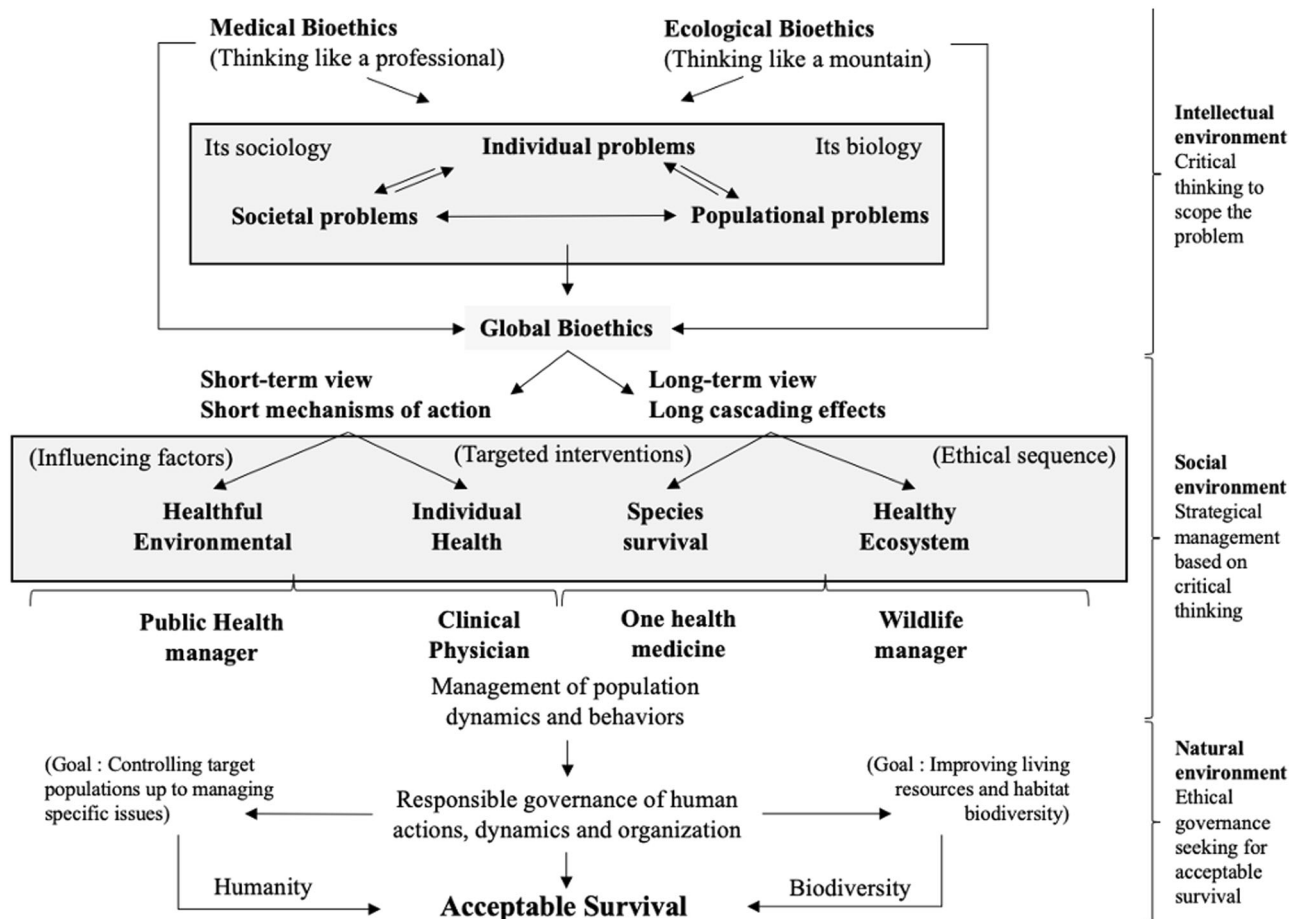


Fig. 1 The Global Hybrid Theory of Bio-Ethics. The idea of a Global Bioethics is, for Potter (2011), the socio-intellectual organization that is encompassing the applied sciences (the 'Bio') and applied ethics that is focusing on one element (the individual, population, species, etc.) or its surrounding system/habitat (e.g., environment). The conceptualization of such organization starts by a Hybrid Theory between two types of (sub) Bioethics, such as the (bio) medical and ecological ones (an adaptation of the 4th chapter, 'Two Kinds of Bioethics' in 'Global Bioethics', hybridizing theories from two cultures: biology and ethics)¹⁸.

Science alone cannot (globally) be that Council (Potter, 1971). Indeed, at the limit of the factual 'certainties' of Science, values must guide human decisions and their systematization into norms (e.g., a policy, law, economy, technology, etc.). And beyond the power of facts and values, norms influence human behavior and societal views on the future. For Potter, a Global Council is a kind of (figuratively) System Thinking unit aiming to articulate these three components of the choice architecture: fact, value, and norm (as a 'Thinking like a mountain', like an inhabitant, and like a professional to recall Leopold poetic prose²⁰, Fig. 1; Max-Neef, 2005; Stoeklé et al., 2020). Furthermore, the task of the Council is not metaphysical, but profoundly empirical and action-oriented, helping individuals to make Cornelian choices and orienting institutional governance bodies to systematize decision-making, policies and regimes adequately. The Council's advice is given on the basis of a *global* thinking to support *local* ethical prioritizations (resource allocation, perspective plurality, power dynamics, etc.). For Potter, this System Thinking Council is a kind of a science-based ethics at the interface of knowledge, technologies and practices that gives the right 'social environment' and adaptive agility to evolve quickly on a local scale without losing sight of the (let's say, Kuhnian and Leopoldian) bigger picture (Fig. 1)²¹.

For Potter, envisioning the future is valued in terms of acceptability. An acceptable project should *sur-vive* (literally *in addition to life*) up to the 'third millennium' while considering

local vulnerabilities (Potter and Lisa, 2001; Potter, 1990; Potter and Whitehouse, 1998). Consequently, acceptability is not (strictly) about consensus and norms, which would be a slippery slope toward the sacralization of the *Power of the Majority* and the *Rule of Law*, and will not survive the *vivid* test of the enduring (millennium) reality²². Acceptability is about values and responsibility. Considering the Jonasian Principle of Responsibility, acceptability places the burden of social-environmental duties on the shoulder of those (persons or institutions) who hold the power. We should avoid the fallacy of sharing responsibilities among the poorest (without the resources or skills) to handle specific / specialized operations for the sake of democracy. The Potterian acceptability helps to conceive and provide paths towards operationalising a more communitarian perspective. As a result, the responsibility is more equitably shared. Moreover, those in positions of power are then more systematically held accountable for their actions if the regime is, by design, iteratively evaluative (reflexive and adaptive) in light of collective values through cyclical community dynamics (Diaz-Castro et al., 2023; Emerson and Gerlak, 2014; Kemp and Loorbach, 2006; Loorbach et al., 2016; Boudreau LeBlanc et al., 2022b). Thus, the acceptable risk / benefit estimation is not projected by a third party outside the community. The estimate is defined ongoingly by / for the community negotiating local-specific and global-generic governance attributes and qualities for responsibility (Fig. 1).

In practice, acceptability is a set of common—but evolving—criteria characterizing principles of conduct. Each principle opens the dialogue about *viable* action paths in daily life and for sustainability. In a nod to Potter, let's call this *wisdom* a communitarian 'collective bioethics', which outlines the responsible actor (the human). Alternatively, if we mobilize the Leopoldian philosophy, the label focus on the scope: building "The Land Ethic", which outlines the responsibility towards the shared resources, habitat, history, and context (Boudreau LeBlanc et al., 2022b); this perspective adds to Potter's 1971 explanation the *globality* of an ecosystem 'social bioethics' dimension. However, we argue that both labels are two sides of the same coin. Under the vocabulary of Ostrom, those ethics pose criteria and paths that pulse a 'self-organized collective action' aiming for a 'long-surviving' in regards to the 'commonly shared resource regimes' (2000). Regarding the regime, human systems have the capacity of self-organization through communication, collaboration, and education (Loorbach, 2007; Schoon and Van Der Leeuw, 2015; Kovacic, 2017), but face the challenge of knowledge translation and dissemination to inform decisions as a result of inter-cultural, inter-disciplinary, inter-generational, even inter-species dialogue: let's say a 'theoretical hybridization', a 'working theory' or, as coined by Alison Wylie in the field of archaeology, an "unifying strategies of a more local and contingent nature" (1999, p.1). Figure 1 hybridizes the organizational and temporal dimensions from the people's short-term perspective up to the community's long-term one.

1. Hybridizing organizational Sociology & Ecology, acknowledging individuals as elements with cognitive & behaviors capable of interacting with counterparts & the environment—the complex & adaptive system.
2. Hybridizing the physical & political dimensions of organizations, acknowledging interactions influenced by encompassing ones—the scale phenomenon & fractality principle.
3. Hybridizing the Anthropology & Geology of evolution, emphasizing short- & long-term mechanisms of organizational transformation, some of which are rooted in natural (e.g., geological sequences) & immemorial times (culture), while others follow the financial, political or daily times²³.

In sum, what is the 'Council on the Future'? Here we emphasize the Potterian and Leopoldian proposal for a new socio-philosophical organization of our ways of thinking, linking Science, Humanities and Communities (Jurić, 2017; Sultonbekovich, 2022)—and distancing them from the reductionist idea of a mere material world unit (e.g., an instituted committee). Although we underline the need for synthesis in Complex Theory (as a conceptualization tool, Wilson, 2014; Stoeklé et al., 2020), our emphasis here is on the constructive, prospective and even normative value of synthesis for building awareness of the context (Boudreau LeBlanc, 2023; Latour, 2007): what we call 'hybridization'²⁴. In practice, this Potterian Council draws its inspiration from the 'Applied Sciences', fundamentally translational (theories-practices), which emerged at the time of Leopold. Thus, the perspective calls bioethics to move beyond the hegemonic intellectual culture of Principlism in biomedicine (the sacralised Principle-based approach: Autonomy, Beneficence, Non-maleficence, and Justice)²⁵. Our argument recalls Potter's initial claim for a *Bio-Ethics bridge*, i.e., to develop principles hybridizing biological fact and ethical value. This implies an even deeper philosophical challenge, because it requires us to move beyond the 'wicked' synthesizes in ethics (as Principlism is a hybrid of Utilitarianism and Deontological approaches) to a 'strong' knowledge hybrid, as qualified by Manfred Max-Neef (1932–2019, 2005) in his framework on *Transdisciplinarity*.

Preparing the social and ethical terrain

In *Reassembling the Social* (2007), Latour revitalizes the meaning of *Sociology*. According to Latour, 'socio-logy' is, all at once, a reasoning, a topic, and a collective: respectively,

1. The rationality of a discipline (*-logical*),
2. A dimension of existence (*social*), and
3. The set of actors building and using this knowledge (sociologists).

These distinctions (discipline, dimension, and in-action) are not unique to sociology. They apply to all fields of knowledge: from the classic (e.g., biology and ethics) to interdisciplinary hybrids such as ecology and bioethics. And they help to operationalize this Potterian "Council on the Future".

John Law (2004), in *After Methods: Mess in Social Science Research*, applies the (socio-organizational) Latourian perspective to the intellectual (metho-epistemological) environment. Methods in sciences are in a constant process of (re)assembling. We find several examples in the literature on Transdisciplinarity and Sustainability, under the approaches of 'action-research' (Piovesan, 2022), and 'community-based research' (Jason and Glenwick, 2016), of this need for agility and reflexivity between theory (methodologies) and practice (technics and protocols) when applying it in situ (Emerson and Gerlak, 2014; Kemp and Loorbach, 2006; Boudreau LeBlanc et al., 2022b). While sometimes quantitative, qualitative, or even mixed approaches are the best suited methodological design, other times a *pure* objective-natural science (Holling, 1973), a comprehensive ethnocultural graph (Driessen, 2012), or an encompassing rational-empirical synthesis hybridizing both is the best fitting (Ives, 2014). For far too long, we have over-emphasized laboratory experiments (medical and engineering) and promoted models outside the world. Ecology—and recently the COVID pandemics—raises awareness of the fact that we cannot understand the world (e.g., the ecosystem) exclusively from the perspective of a test tube (the in vitro experiment); we need to walk the terrain and accept compromises, i.e., we need a strong awareness of our research objective, the resources at our disposal and previous studies by our peers (including by the community). As Potter noted (1988), this Philosophy of Science's ecological understanding justifies exploring the operational path of *constructivism* in and about sciences, i.e., 'deconstructing' methods in (rational) ethics to 'reconstruct' them with (empirical) in situ one in light of Leopold and Potter's view of environmental management²⁶.

First, ethics is a discipline. The 'object' of study is value, i.e., the *objective* of empirical ethics research is generally to describe, understand or prioritize a set of values characterizing a case. However, field ethicists go beyond this value-based appreciative advice. After the study of the emerging system of (local) values, they highlight the underlying (social) qualities that give the *axis* to decision-making (i.e., its meaning, orientations, directions, etc.)²⁷. In philosophy, rational studies in ethics focus on theorizing the meta-reasoning behind a value system (the 'Why') that explains the – let's say – *good* sense to human actions. Second, ethics is a dimension. This 'axiological' dimension generates a psycho-intellectual environment per se from which emerges critical thinking and standpoints²⁸. These standpoints vary according to several rational factors driven by the person's reflexivity, cultural identity, and intellectual curriculum. Third, ethics is in-action. This third facet is the key to address one of the arising practical challenges. Ethics must scale up from a cognitive to a collective attribute. Beyond virtuous *good willing* people, we need *good valuable* policies. This means scaling up critical thinking from the individual 'I' to the collective 'we', as the intellectual functioning enters the social-organizational level. Interpersonal dialogues remain the primary unit to foster critical thinking and

empower organizations (Widdershoven et al., 2009; Groot and Abma, 2022). The process leading to constructive criticism needs methods to scale dialogues to interinstitutional mediation and translation systems. Appendix 2 gives the framework designed in three iterative analytical phases to assemble methods for conducting a 5-year PhD project in experimental bioethics on anti-microbial governance and data ethics.

Learning from the organization sociology field and a 5-year experience in global bioethics, preparing the terrain for more resilience is crucial. The ‘terrain’ means guiding ecologically, socially and ethically scientific projects with the potential to influence policymaking and societal programs. And the pooling of all the knowledge on how to prepare and reassemble the terrain (Latour, 2007) should become our *Council on the Future* highlighted by Potter as a ‘Science for Survival’ (1971). ‘Preparing’ requires:

1. A theoretical approach & models to deepen critical reasoning to manage ethical dilemmas.
2. A large-scale method to guide authorities in building transparent policies & critical evaluations to advance governance in adopting a responsible management process.
3. A practice enacted by / within the community focusing on both A- the hazards and B- the impacts of decisions & the managing process.

Operationalizing Global Bioethics appears as a *Council* or even a *toolbox* for trained (bio)ethicists valuable to assist governance bodies and communities²⁹. However, bioethics and bioethicists do not have the capacity or responsibility to identify or solve all ethical issues globally. Fields of natural, social, and human sciences contribute to ethics by improving knowledge of human beings, behaviors, and actions, and the surrounding factors influencing power and will, even human survival, as outlined by Potter. Bioethicists need to learn from methods in global, multisite, and network ethnography (Jarzabkowski et al., 2015; Berthod et al., 2017; Gille and Riain, 2002), and to acknowledge more cleverly critical thinking in systems from individuals (Abma et al., 2010) to the organizational scale (Samuel et al., 2019) with a focus on concerns (Driessen, 2012), tensions (Frauenberger et al., 2017) and integrations (Wilson, 2014; Ives, 2014). However, empirical bioethics is not just about data and quantification but also about critical reflexivity (Ives, 2014; Earp et al., 2020; Zeiler and De Boer, 2020). In short, we should integrate local thinking and experimentalism into global bioethics:

1. Thought experiment aiming to give sense to human action,
2. Consensus-building deliberation to shape value systems for societal transformation.

In practice, this turn starts by having global bioethicists in the field working with sociologists (as called by Latour 2007), other experts, and communities on building—public, civic, corporate, and academic—eco-social responsibility toward the future (see the call from Sustainability studies led by management sciences, Jacob Dahl, 2019). However, this movement driven by the practices milieu in Society must also come from the theoretical spheres in academia reorganizing the structure of disciplines (see the call for a One Health convergence, Beever and Morar, 2019; Boudreau LeBlanc et al., 2022a; Frauenberger et al., 2017; Earp et al., 2020). However, to accomplish this task, the bioethicist should have a toolbox.

The Toolbox of Global Bioethics

Using a common language is the cornerstone for experts and non-experts bounding. It can unwind complex human situations when built on the target audience’s terminological and

ontological jargon. For instance, the ‘What’s In It For Me’ (WIIFM), a leading marketing tactic in corporate communications, can help illustrate this idea. The *me* must become *us* to allow for synergies and ‘win-win strategies’, another business tactic. Callon provides a deeper understanding of WIIFM (1986). Accordingly, the *me* is unbreakable of the *us* (Bilodeau and Potvin, 2018; Fox, 2000; Bou Saba, 2011; Esmonde, 2018). All *me.s* are networked in the social area, generating controversies while discourses are shocked. More subtly, the *me* can be a whole institution (Boudreau LeBlanc and Williams-Jones, 2022), as a public, academic, and private moral person carrying a (justificatory) position—e.g., role, interest, and mission—characterizing the Government, University or Business actors (Boudreau LeBlanc and Williams-Jones, 2022).

Depending on the positioning of each actor (Boudreau LeBlanc and Williams-Jones, 2022) and the *problematization* coined by their collective, specific alliances arise, and the *interesement* process begins³⁰ (Callon, 1986). *Problematization* is about common resources, such as the management of the St-Brieuc Bay Scallops (Callon, 1986), or new databases, such as PULSAR (Santé Durable [Sustainable Health] Université Laval) and GloBI (Global Biotic Interactions). And one *problematization* can lead to another, such as building public-private-academic collaborative partnerships and sustaining trust or conducting responsible research and innovation. These needs pulse the movement, engagement, and commitment, thus an *enrolment* phase. Callon acknowledges enrolment as “a set of strategies in which the researchers [or the entity in charge of stabilizing the initiative] sought to define and interrelate the various roles they had allocated to others” (1986, p.1). However, these self-interested alliances do not happen by themselves. Building on Callon’s theory, the paper emphasizes the need for translation tools in ethics and for collaborative governance to provide a common “roof” to cooperate, which might appear as an agreement of governance, evaluation, and research principles.

The path towards translation is framed by “Obligatory Points of Passage” (OPP). OPP benefits from the presence of researchers, as they “determined a set of actors and defined their identities in such a way as to establish themselves in the network of relationships they were building” (Callon, 1986, p.6). We argue for having OPP in a strategic *milieu*, as data arbitration centers, to open debate on resolving controversies by sharing information between expert and non-expert perspectives (Boudreau LeBlanc, 2022). Dialogue on data governance advances the idea of ‘hybrid forums’ and ‘hybrid communities’ by sophisticating the negotiation process (see Appendix 1), for instance, by mutualizing health and environment surveillance data to negotiate an ever-more sustainable path to manage the issue. When set before a crisis, hybrid forums engage and deepen the discourses of a controversy. Those places could highlight the underlying ethical values and application paths (Boudreau LeBlanc and Williams-Jones, 2022). Introducing bioethics to Latourian thinking could favor *mobilization* (Petersen, 2013; Williams-Jones and Graham, 2003). According to Callon, mobilization is the assemblage of “a set of methods used by the researchers to ensure that supposed spokesmen for various relevant collectivities were properly able to represent those collectivities and not betrayed by the latter” (1986, p.1). In short, Callon et al., 2001 propose a reflexive translational path to transform intangible social *processes* into tangible political-methodological strategies to act collectively.

Having in dialogue the *Me(s)* should not offload responsibility onto one another. The goal is to sketch pathways through a deliberation process with two (social) parties involved: the experts and ‘spokespersons’ of the community. Instead of a hybrid forum, let’s propose the synthetic idea of WIIFU-M: ‘What’s In It For Us-Me’? The *Us-Me* is a nod to the Latourian social theory

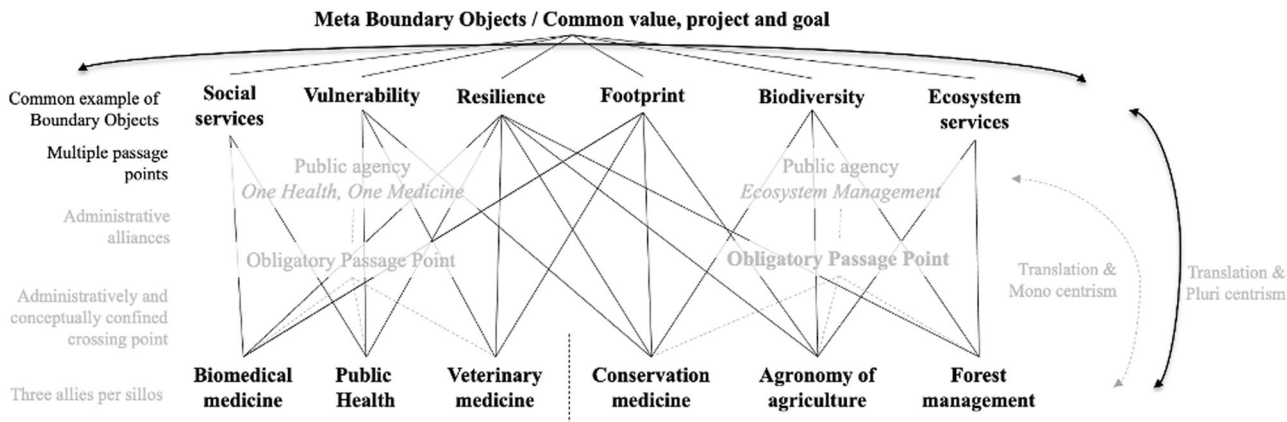


Fig. 2 The Future-Oriented Human Council. Using boundary-objects to develop a system of knowledge that is bridging the Facts/Values complex unit and the theories' translation/practices' experimentalism could help imaging the Potterian Future-Oriented Human Council. However, we need to reorganise our ways of thinking, in particular by proposing OBs for recruiting allies (the bottom up, close to practices, the 'micro'), others for advancing controversies between applied sciences (the midway translation, close to institutional missions, the 'meso') and the last for developing the reasoning of fundamental sciences in response to the living experience of the world (the top down, positing the philosophy of science in dialogue with the common, the traditional and the culture, the 'macro/meta').

developed between 1980 and 2000 – the Actor-Network Theory. The WIIFU-M allows for a shift from an individual ethics to a collective one (Bilodeau and Potvin, 2018; Piovesan, 2022; Jacob Dahl, 2019). Moreover, it lays the foundation for a frame of reference to assist managers in sharing responsibilities. Ultimately, the “including me” can result in one party taking responsibility for another (e.g., vulnerable, invisible, or non-human communities).

One of the challenges of complexity is to manage knowledge, as West Churchman (1913–2004, 1967) introduced with the concept of the ‘Wicked problem’. Wicked problems are like a puzzle where a piece is always missing, notably because the boundaries constantly change. The logic of solving a wicked problem is: “[...] to shift the goal of action on significant problems from ‘solution’ to ‘intervention’. Instead of seeking the answer that totally eliminates a problem, one should recognize that actions occur in a process, and further actions will always be needed.” (Knapp, 2008) These problems lead to some challenges, notably the bridging of Science and Policy, because they:

[...] are not only difficult to define, there exist no right or wrong solutions for them, only better or worse solutions because they involve competing goals, divergent values, little scientific agreement on cause-effect relationships, imperfect information, and inequitable distribution of political power in implementing and influencing planning (Hull, 2009).

Accordingly, one key Philosophy or Science advanced is the logic of adaptive and learning cycles. Adaptability traits should be archived in a translational unit to enable ‘learning’. Susan Star (1954–2010; 2010) Star and Greisemer, 1989) coins the concept of ‘boundary-object’ (BO, see also Loorbach et al.’s perspective on transition, 2016), introducing a vehicle for knowledge transfers and social dialogues. Figure 2 applies BO to Max-Neef (2005)’s theoretical framework of transdisciplinarity. Transdisciplinarity unpacks the organization of translation (Chursinova et al., 2022; Beever and Whitehouse, 2017). At the same time, the BO helps conceive the vehicle bridging Sciences, Humanities and Society, which is outlined by Potter as a “Bridge to the Future” (1971) and the ‘wisdom’ of a ‘Future-Oriented Human Council’ (ten Have, 2012; Langlois, 2013).

Translation paths must interconnect abductively theory and practices, as Charles Peirce (1839–1914), Karl Popper

(1922–1996), Kuhn and several others explain. However, those paths must seek to bridge applied disciplines under the same rooftop (a hybrid of facts and values). On the one hand, technics and practices improve individual, populational, and community operations, while values give it sense, e.g., Care & Biodiversity. Thus, Potter calls for a new *object* of study that unpacks this classical *boundary* between Science and Ethics disciplines (‘boundary-objects’, BO). As Callon sketches, these BO generates a system (BOs) whose organization of knowledge is the very object of the Sociology of translation. When researchers enter the field, the BOs materialize itself as a habitat of knowledge (eco-BOs). However, concerned citizens should be empowered and capable of managing the use of the ecoBOs. We argue the need for bioethics and bioethicist to remain alert of the risk of radical knowledge shift, as introduced by Daniel Callahan (1930–2019) when facts are used without their corresponding sense (Boudreau LeBlanc et al., 2021a; Callahan, 1973).

BO are not absolute (ontological) knowledge. If the frame stays the same, the BO content varies with time depending on environmental, technological, anthropological, sociological, and intellectual changes. For instance, the BO of ‘social and ecosystem services’ frames anthropology and ecology in the jargon of economy (Peçanha Enqvist et al., 2018; Brand and Jax, 2007; Abson et al., 2014). A BO provides a working theories, which is setting a *frame-to-work* (a framework) from one discipline to another (Morar, 2019; Osorio, 2017; Mertz and Schildmann, 2018). For instance, organizational ‘resilience’ has bridged Baltimore, Chicago, and Mining Schools, and advanced urban ecology, planning and care under the ecological and ecosystem metaphor (the ‘ecosystemic’). However, to build intellectual bridges in practice, we need well-done working theories to prepare the terrain.

Conclusion

The ecosystemic approach could bridge medical & environmental fields and practices in managing Care, Production & Biodiversity. However, some epistemological challenge remains. We argue that reviewing the Potterian and Leopoldian views of Biology and Ethics may help. Both authors valued codes of conduct (*The Land Ethic* and *A Bioethical Creed*). Still, this normative knowledge should not be used dogmatically, as a legal unit or a static theory pulsing top-down power dynamics. The Potterian Creed is built on experience, supported by communication and served societal

projects envisioning a better future. In these times of crisis, global bioethics scholars should open a large-scale thinking program on the place and application of the Leopoldian adaptive ecosystem co-management technics and philosophy in medical & environmental fields and practices. Accordingly, the author has studied this perspective since 2018 at the level of information and communication technology systems by improving the operation of policies regarding the adoption and management of digital environments, data networks, and artificial intelligence (Boudreau LeBlanc, 2022; Boudreau LeBlanc et al., 2021b; Bérubé et al., 2022). The work of bioethics critically examines the value of working theories as they are operated and constructed as boundary objects (Boudreau LeBlanc et al., 2021a; Boudreau LeBlanc, 2022). The role of fieldwork bioethicists is to develop tools and their justificatory reasoning (Boudreau LeBlanc et al., 2022c) to help concerned researchers, leaders, and citizens to own the wheel of change.

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Notes

- 1 The value of cultural adaptation is still considered as the driver of human evolution and survival in current circles of anthropology, as highlighted by the work of (Henrich and Muthukrishna, 2023). They associate human survival to its unique ability to transmit knowledge from generation to generation.
- 2 Beyond 'Wilderness', the environment means the surrounding space and conditions contextualizing our actions and thoughts. The argument here acknowledges this broader perspective where the environment is ecological, social and intellectual.
- 3 See the warning emerging in the literature about the metaphor 'ecosystem' use in economy, in particular the innovation, industrial and financial sectors (Boudreau LeBlanc et al., 2021a; Oh et al., 2016).
- 4 See the thinking of Millstein (2018) on the Leopoldian interdependence—which is linked to cooperation, responsibility, and ethics—and also the economic perspective of Elinor Ostrom (1933–2012; Paniagua, 2022) on the social-ecological system or even Rademacher et al. (2019) on co-production. See also the Edgar Morin's *bio-socio-anthropological* model on human complexity (1994).
- 5 Key figures are, recently, Greta Thunberg in the sociopolitical area and historically scientists and philosophers as James Lovelock (1919–2022, *The Gaia Hypothesis*), Aldo Leopold (1887–1948, *The Land Ethic*) and Arne Næss (1921–2009, *Deep Ecology*).
- 6 In English, two perspectives fall under the term 'ecosystem approach'. Literally, it refers to an environment management *approach* applied *per ecosystem* for the goal of conservation or use (Norton, 2005). Metaphorically (in French *ecosystemic*), it refers to an organizational approach in Sociology of Science applied to the power and knowledge dynamics in an adaptive manner. This paper focuses more on the second meaning of the approach.
- 7 The term 'ecosystem' is used not only to designate natural environments, but also human ones—e.g., the urban ecosystem (still natural) and technosocial ones (business, innovation, finance, etc.). The 'ecosystemic' concept, coined in the field of Sustainability, has radiated and, in the fields of health (especially in human and veterinary epidemiology and public health), it becomes 'ecohealth' (Charron, 2014).
- 8 Ernst Haeckel (1834–1919) coins the term 'Ecology' following Darwin's perspective on an 'Economy of Nature', which echoes the historic dialogue between the two fields, as norms (*-nomos*) of Society (*eco-*) to understand the Habitat functioning (*Eco-*).
- 9 Analogies come with innovation and flaws. We should recall the work of Herbert Spencer (1820–1903), where the 'Natural Evolution' – the one Charles Darwin (1809–1882) links to a (large-scale) geo-eco phenomenon (the 'natural selection') – was applied literally and reductively to society (a social Darwinism).
- 10 Some scholars outline the Darwinian revolution. Consequently, the axiom of modern biology has shaken the philosophical basis of most disciplines. However, analogies come with innovation and flaws.
- 11 The perspective here echoes Thomas Kuhn (1922–1996) theory on knowledge organization and construction, notably the concept of 'paradigm' (Kuhn, 1962).
- 12 In the field of health sciences, especially in veterinary medicine, we see a profound (axiological) debate between anthropocentrism and biocentrism, e.g., between agricultural production and conservation medicine.
- 13 During this same period in public health, Urie Bronfenbrenner (1917–2005; 1979), one of the thinkers who laid the groundwork for the contemporary *New Health* perspective (Lalonde, 1974), bridges the ecological and psychological dimension in one model of human development (deLaplante, 2008; Steiner, 2008).
- 14 The *Montreal Declaration for a Responsible Development of Artificial Intelligence* incorporated the perspective of hybrid forums into its methodology (Dilhac et al., 2018).
- 15 See *in-action research* (Whitehouse and Whitehouse, 2020; Latour, 2005) or *action-research* (Piovesan, 2022; Frauenberger et al., 2017; Lewin, 1946), where critical reflexivity is proposed as the bridging piece (the '-').
- 16 Aldo Leopold (1887–1948) and Van Rensselaer Potter (1911–2001) have contributed greatly to the advancement of philosophical discussion seeking to unravel the Nature / Culture dichotomy, and to match fields of practice that are consequently disconnected due to shared political jurisdictions (e.g., the management of human health, labor productivity and environmental biodiversity).
- 17 The Leopoldian concept of 'biotic community' relates to interdependency and co-operation. The community describes a group of interdependent individuals, populations, and species inhabiting a commonly shared milieu with finite resources which forces *constructive* and *disruptive* interactions, but – in the end (i.e., the dynamic ecosystem equilibrium) – all those inhabitants find their respective niche and co-operate independently through the interdependent link of the habitat (Leopold, 1933, 1949; Millstein, 2018, 2015).
- 18 This figure is adapted from Van Rensselaer Potter's (1911–2001) 1988 book on "Global Bioethics: Building on the Legacy of [Aldo] Leopold" (1887–1948). To update Potter's thinking, certain liberties have been taken. One of the main criticisms of Potter's arguments is about 'controlling human fertility' and 'stabilizing the world population'. These formulations certainly appear radical to people outside the jargon of ecology. To facilitate translation of the perspective, the figure makes explicit the perspective, a priori general (applied to all species): 'Management of population dynamics and behaviors' and 'Responsible governance of human actions, dynamics and organization'. If a 'political' control of fertility proceeds with intrusive regulations into private life which literally limit births, an ecological understanding implies increasing education, parental care, resources allocated to women, etc., to increase care per child (strategy K) instead of increasing the frequency of births with low 'parental' and social care (strategy R). While the political understanding of 'fertility control' is short-term and with interventionist measures, the ecological understanding is long-term and with organizational resilience.
- 19 Gilbert Hottois (2011) accurately describes what Potter means by 'Council on the Future', but reduces his perspective to an (international, even globalized) institution and a desire to extend biomedical bioethics (including Principlism: Autonomy, Beneficence, Non-Maleficence and Justice) to encompass an environmental/ ecological bioethics which, in sum, embraces the individual, the community and their context. Potter does indeed endorse this! But he goes further, notably by linking his perspective of the 'Global' to Thomas Kuhn (1922–1996, in 1971) and Aldo Leopold (1887–1948, in 1988), and thus by outlining the relevancy of a Philo-sociology of science and of the environment, that is not strictly related to a globalized materialized political institution.
- 20 The 'professional' and 'mountain' reference is a nod to Aldo Leopold's (1887–1948) famous poem "Thinking like a Mountain" published in 1949 in the posthumous work "A Sand County Almanac" in retrospect to one of his greatest lessons learned in the field, when he was a forester and wildlife manager, and he (and the scientific techniques of his day) had overlooked the effect of environmental pressures (fire and climate, i.e., the third 'player', the mountain) on the future of fauna and flora population dynamics. This lesson outlined in his work 'Game Management' (Leopold, 1933) is the cornerstone of the new scientific discipline of which he is the founder—a translational perspective of wildlife management at the intersection of applied ecology and environmental use practices—as well as the basis of the Land Ethic that has greatly contributed to the advancement of the contemporary perspective of environmental ethics and global bioethics according to Van Rensselaer Potter (1911–2001).
- 21 Van Rensselaer Potter (1911–2001) is keenly aware of the challenges surrounding the pluralism of human perspectives and the value of cultural diversity (which he sees as one of the driving forces behind human 'cultural adaptation'). According to him, perspectives and cultures can be weakened by human power dynamics, including geopolitical forces and cultural or intellectual hegemonies. Here, in terms of the big picture, we are talking about the organization of knowledge (e.g., *how, collectively, do we judge that a piece of knowledge is valid, credible, transferable, etc.?*) and the bringing silent paths in society to light (including non-human beings, things and landscapes).
- 22 Van Rensselaer Potter (1911–2001) has made a highly critical contribution to the debate on sustainability (hence the choice of words here). He prefers the notion of acceptability to sustainability, to emphasize this 'endurable' dimension for individuals, communities and ecosystems.
- 23 In terms of climate change, long ecological cascades such as the carbon cycle are etched into the Cambrian times and impel ongoing effects on culture and the daily life of people. N.B. Long cascades does not mean any short-term effect; but effects at work for a long time (Potter, 1987).
- 24 *Hybridization* and *hybrid* are, in a nod to Aldo Leopold (1887–1948) and Van Rensselaer Potter (1911–2001), a reference to the origin of a new species in biology

- and, in a nod to the field of organization sociology, a reference to the Michel Callon's *Hybrid Forum* and *Hybrid Community* (2004). Doing so, we believe we are using a suitable jargon for interdisciplinary translations. In connection with what follows, we see the 'hybrid' as the *object* at the *boundary* of synthesized disciplinary knowledge (e.g., *facts*, on the one hand, and *values*, on the other) – however, here the term 'hybrid' is used, because it seems more revealing than Suzan Star's (1954–2010) vocabulary of *Boundary-Object* (see below).
- 25 The author definitively recognizes the value of *Principlism* in resolving/managing many types of dilemmas, multilemmas and even local (Beever and Brightman, 2016) and worldwide (Gordon, 2011) ethical problems which, in many situations, have gone beyond the biomedical framework in which this Principle-Based Approach was conceived. However, as Van Rensselaer Potter (1911–2001) outlined, this approach has its own limitations and conditions of application (Stoeklé et al., 2020; Clint Parker, 2022; López, 2004; Turner, 2009).
- 26 This perspective explained in light of Bruno Latour (1947–2022) and John Law is similar to the one advanced by Manfred Max-Neef (1932–2019) in the field of political economy and ecology coined as 'deep transdisciplinarity' (Max-Neef, 2005), and notes also the discussion conducted by Peter and Catherine Whitehouse (2020) in the *Social Construction in action* discussion leading by The Taos Institute, following the Jonathan Beever and Peter Whitehouse (2017) call for bridging to light *The Ecosystem of Bioethics*, as a useful metaphor to bridge medicine, ecology and ethics.
- 27 In philosophy, the field of ethics is called 'axiology' for this reason.
- 28 This reflexive, introspective and subjective aspect of ethics is widely advanced by feminist approaches (Lumsden, 2019; Wylie, 2012).
- 29 The *Toolbox* metaphor echoes the pragmatism philosophy.
- 30 Callon chooses "The vocabulary [...] of intersement and enrolment [...] to follow the researchers in their struggles with those forces that oppose them without taking any view about the nature of the latter." (1986, footnote 39)
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Competing interests

The author declares no competing interests.

Additional information

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