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OVERLINE

An inclusive approach to assess nature's contributions to people

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A major challenge today, and into the future, is to maintain or enhance beneficial contributions of nature to a good quality of life for all people. This is among the key motivations of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), a joint global effort by governments, academia, and civil society to assess and promote knowledge of the Earth's biodiversity and ecosystems, and their contribution to human societies, in order to inform policy formulation. One of the more recent key elements of the IPBES framework (1) is the notion of nature's contributions to people (NCP). NCP builds upon the ecosystem service concept popularized by the Millennium Ecosystem Assessment (MA) (2). But the NCP as defined and put into practice in IPBES differs from earlier work in several important ways. First, NCP recognizes the central and pervasive role that culture plays in defining all links between people and nature. Second, NCP elevates, emphasizes and operationalizes the role of indigenous and local knowledge in understanding nature's contribution to people.

The broad remit of IPBES requires it to engage a wide range of stakeholders, spanning from natural, social, humanistic and engineering sciences to indigenous peoples and local communities in whose territories lies much of the world's biodiversity. Being an intergovernmental body, such inclusiveness is essential not only for advancing knowledge, but also for the political legitimacy of assessment findings (3).

FROM SERVICES TO CONTRIBUTIONS

NCP are all the contributions, both positive and negative, of living nature (i.e. diversity of organisms, ecosystems, and their associated ecological and evolutionary processes) to people's quality of life (4). Beneficial con-

tributions include, e.g., food provision, water purification, and artistic inspiration, whereas detrimental contributions include disease transmission and predation that damage people or their assets. Many NCP may be perceived as benefits or detriments depending on the cultural, socio-economic, temporal or spatial context. For example, some carnivores are recognized –even by the same people– as beneficial for control of wild ungulates, but as harmful because they may attack livestock.

At first inspection, the notion of NCP does not appear to differ much from the original MA definition of ecosystem services (2), which was broad and contemplated links to many facets of wellbeing. However, the detailed conceptualization and the practical work on ecosystem services following on the MA were dominated by knowledge from the natural sciences and economics. The natural sciences, and ecology in particular, were used to define “ecological production functions” to determine the supply of services, conceptualized as flows stemming from ecosystems (stocks of natural capital) (5). Economics was used to estimate the monetary value of those ecosystem services flows, to identify tradeoffs among them, and their impacts on wellbeing. Aided by the fact that ecology and economics had readily-available tools, the ecosystem services approach developed into a vibrant research field, widely influenced policy discourse, and clearly advanced the sustainability agenda.

However, this predominantly stock-and-flow framing of people-nature relationships largely failed to engage a range of perspectives from the social sciences beyond economics, or those of local practitioners, including indigenous peoples (6). This reinforced a mutual alienation process in which MA-inspired studies and policies became increasingly narrow, which in turn led to voluntary self-exclusion of disciplines, stakeholders and worldviews. As a consequence, the ecosystem services research program proceeded largely without benefit-

ing from insights and tools in social sciences and humanities. For example, the unpacking and valuation of some “cultural ecosystem services” not readily amenable to biophysical or monetary metrics have lagged behind (7), and so has their mainstreaming into policy. In addition, as diverse disciplines and stakeholders remained at the margins, the initial skepticism towards the ecosystem services framework turned into active opposition, often based on the perceived risks of commodification of nature (8) and associated social equity concerns (9).

The need to be inclusive, both in terms of the strands of knowledge incorporated and representation of worldviews, interests and values (10), required IPBES to move to NCP. While still rooted in the MA ecosystem services framework (Figure S1), this new approach has the potential to firmly embed and welcome a wider set of viewpoints and stakeholders. It should also be less likely to be subsumed within a narrow economic (e.g., market-based) approach as the mediating factor between people and nature.

AN INCLUSIVE SYSTEM

The NCP approach explicitly recognizes that a range of views exist. At one extreme, humans and nature are viewed as distinct (2); at the other, humans and non-human entities are interwoven in deep relationships of kinship and reciprocal obligations (11, 12). In addition, the way NCP are co-produced by nature and people is understood through different cultural lenses. For instance, co-production of food in high-diversity agriculture can be framed as a process that combines a set of biological and technological inputs aimed at maximizing coexistence between useful plants and animals to achieve higher yields.

Alternatively, co-production of food can be seen as a “practice of care” (12, 13) through social relationships and connection with spiritual entities. Therefore, we propose two lenses through which to view NCP: a generalizing perspective, and a context-specific perspective. While presented here

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1 as extremes, these two perspectives are of-
2 ten blended and interwoven (14), enabling
3 co-construction of knowledge among disci-
4 plines and knowledge systems (Figure S2).

5 **Generalizing perspective:** Typical of
6 the natural sciences and economics, this
7 perspective (represented in green at the
8 bottom of Figure S2) is fundamentally ana-
9 lytical in purpose; it seeks a universally ap-
10 plicable set of categories of flows from na-
11 ture to people. Distinction between them is
12 often sharp and agency is acknowledged on-
13 ly in the case of people. NCP categories can
14 be seen at finer or coarser resolution, but
15 can still be organized into a single, self-
16 consistent system.

17 IPBES identifies 18 such categories for
18 reporting NCP within the generalizing per-
19 spective, organized in three partially over-
20 lapping groups: regulating, material and
21 non-material NCP (Figure S3, Table S1), de-
22 fined according to the type of contribution
23 they make to people's quality of life.

24 **Material** contributions are substances,
25 objects or other material elements from na-
26 ture that directly sustain people's physical
27 existence and material assets. They are typi-
28 cally physically consumed in the process of
29 being experienced, for example when or-
30 ganisms are transformed into food, energy,
31 or materials for ornamental purposes.

32 **Non-material** contributions are nature's
33 effects on subjective or psychological as-
34 pects underpinning people's quality of life,
35 both individually and collectively. Examples
36 include forests and coral reefs providing
37 opportunities for recreation and inspiration,
38 or particular animals and plants being the
39 basis of spiritual or social-cohesion experi-
40 ences.

41 **Regulating** contributions are functional
42 and structural aspects of organisms and
43 ecosystems that modify environmental con-
44 ditions experienced by people, and/or
45 regulate the generation of material and non-
46 material contributions. Regulating contribu-
47 tions frequently affect quality of life in indi-
48 rect ways. For example, people directly en-
49 joy useful or beautiful plants, but only
50 indirectly the soil organisms that are essen-
51 tial for the supply of nutrients to such
52 plants.

53 Culture permeates through and across
54 all three broad NCP groups (Figure S1), ra-
55 ther than being confined to an isolated cate-
56 gory (e.g. as in the ecosystems services
57 framework). In addition, the three broad
58 groups, rather than being independent
59 compartments, as typically framed within
the ecosystem services approach, explicitly
overlap. We distinguish them for practical

reporting reasons, acknowledging that
many of the 18 NCP categories do not fit
squarely into a single group (Figure S3). For
example, food is primarily a material NCP
because calories and nutrients are essential
for physical sustenance. However, food is
full of symbolic meaning well beyond physi-
cal survival. Indeed, non-material and ma-
terial contributions are often interlinked in
most, if not all, cultural contexts (7).

Context-specific perspective: This is
the perspective typical, but not exclusive, of
local and indigenous knowledge systems
(represented in blue at the top of Figure S2).
In local and indigenous knowledge systems,
the production of knowledge typically does
not explicitly seek to extend or validate itself
beyond specific geographical and cultural
contexts (14). Indeed, the context-specific
perspective on NCP often tends to resist the
scientific goal of attaining a universally-
applicable schema.

While subdivision into internally con-
sistent systems of categories is common in
many local knowledge systems, a universally
applicable classification, –such as the one
proposed in the generalizing perspective on
NCP (Table S1)– is not currently available
and may be inappropriate due to cultural in-
commensurability and resistance to univer-
sal perspectives on human-nature relations.
The context-specific perspective may in-
stead present NCP as bundles that follow
from distinct lived experiences, such as fish-
ing, farming or hunting, or from places, or-
ganisms or entities of key spiritual signifi-
cance such as sacred trees, animals or
landscapes (11, 13).

Providing space for context-specific per-
spectives recognizes that there are multiple
ways of understanding and categorizing re-
lationships between people and nature, and
avoids leaving these perspectives out of the
picture or forcing them into the 18 general-
izing NCP categories. The NCP approach
thus facilitates respectful cooperation across
knowledge systems in the co-construction
of knowledge for sustainability.

NURTURING A PARADIGM SHIFT

NCP extends beyond the highly influen-
tial, yet often contested, notion of ecosystem
services, incorporating a number of inter-
disciplinary insights and tools. Most of them
were called for during the past decade (9,
10, 12, 14), but only now enshrined explic-
itly in an environmental assessment frame-
work.

The implementation of the NCP ap-
proach and its reporting categories (Tables
S1 and S2) is still in its infancy, and is ex-

pected to be fully fledged only in the IPBES
Global Assessment, but it is already chang-
ing assessment procedures, and their out-
comes. For example, the on-going IPBES re-
gional assessments include unprecedented
effort to tap indigenous and local
knowledge, from the literature and also
from dialogues with indigenous and local
knowledge-holders, where they contributed
information presented in their own narra-
tives. In the Europe and Central Asia as-
sessment, these narratives (15) revealed
complex interactions between detrimental
(predation on livestock) and beneficial NCP
(carcass removal, protection by shep-
herd/guard dogs) that were not considered
in previous national ecosystem assess-
ments. This kind of evidence also enhanced
the confidence about the status and trends
of other NCP in cases where the evidence
based on published literature was scarce
(e.g. for NCP 17, Supporting identities). In
this regional assessment, it was relatively
easy to fit most narratives into the 18 cate-
gories of the generalizing perspective on
NCP.

In assessing pollinators, pollination and
food production (16), the dialogue with lo-
cal and indigenous knowledge-holders high-
lighted some NCP defined as practices of
care gifted to people, such as fostering polli-
nator nesting resources in forests, totemic
relationships requiring reciprocal obliga-
tions between people and pollinators, and
traditional governance that depends on on-
going presence of bees and butterflies in the
landscape (Table S2) (13). These context-
specific NCP do not fit easily in the 18 gen-
eralizing NCP categories. Nevertheless,
these knowledge contributions under-
pinned innovative strategic responses high-
lighted in the main messages to policy mak-
ers agreed amongst all the countries who
are members of IPBES (16), to strengthen
traditional governance and tenure systems
that support pollinators- critical in many
places where these systems are being erod-
ed through rapid industrialization.

These examples illustrate how the in-
terweaving of epistemologically diverse
lines of evidence (14) about specific subjects
can result in richer solutions for people and
nature, even within the context of large-
scale assessments. But regardless of the out-
comes of the assessments, the consideration
of different knowledge systems, and the fact
that generalizing, context-specific and mixed
perspectives are considered as equally use-
ful, matters in terms of making IPBES pro-
cedures and outcomes more equitable. This
should help overcome existing power

1 asymmetries between western science and
2 indigenous and local knowledge, and among
3 different disciplines within western science,
4 in the science-policy interface. The NCP ap-
5 proach aims at coming up with products
6 that are better and also more legitimate,
7 and therefore more likely to be incorpo-
8 rated into policy and practice.

9 In addition to assessments, environmen-
10 tal governance and associated policies
11 would likely increase their effectiveness and
12 social legitimacy by drawing on the NCP ap-
13 proach. This is because it facilitates much
14 more than previous framings the connec-
15 tion with rights-based approaches to con-
16 servation and sustainable use of nature, and
17 their implications for quality of life. The
18 presence of multiple worldviews and di-
19 verse ways of expressing them in the word-
20 ing of the Convention on Biological Diversi-
21 ty's strategic plan for biodiversity and
22 specific objectives such as the Aichi Targets
23 further illustrates how important inclusive
24 framings are to the broad political legitima-
25 cy of these international objectives and their
26 implementation instruments.

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