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Societal Drivers, Benefits, Goods and Wellbeing

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DISCLAIMER

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1. Introduction

The term societal benefits can have various interpretations and definitions (Potschin et al., 2016) but in the Marine SABRES project the term 'societal benefits' refers to:

'those qualities and quantities satisfying human health and well-being and the economy which are derived from ecosystem services after inputting capital (built, human and social), including the human assets of energy, time, money, skills, knowledge and an ability to be sentient.'

This expanded definition is consistent with the brief definition of societal benefits from the UK Natural Capital Committee (2019): '*Changes in human welfare (or well-being) that result from the use or consumption of goods, or from the knowledge that something exists*'. The term benefits is used here as being synonymous with the term 'goods and benefits' used elsewhere (Turner et al., 2014, 2015; Marcos et al., 2021; Elliott, 2023) in which all goods (as materials) are benefits but not all benefits may be material goods; this may differ from a purely economic view of a human good as a term for all benefits.

This briefing paper introduces the above concept in the context of the marine environment and it shows the linkages with the concepts of natural capital, ecosystem services, the complementary role of capital and human assets, as these are central to our understanding of societal benefits. The relationships between these concepts are depicted in Figure 1 which places societal benefits, including material goods, at the right-hand side (RHS, the human domain) of a continuum resulting from the structure and functioning of the natural domain (the left-hand side). Securing those benefits is necessary to satisfy 'Drivers', as basic human needs as an element of the DAPSI(W)R(M) framework (Elliott et al., 2017), which is the underpinning framework of the Simple Social-Ecological System being designed and tested in Marine SABRES (Gregory et al., 2023); thus, it is emphasised that drivers motivate the need to carry out activities in order to secure societal benefits, including material goods.

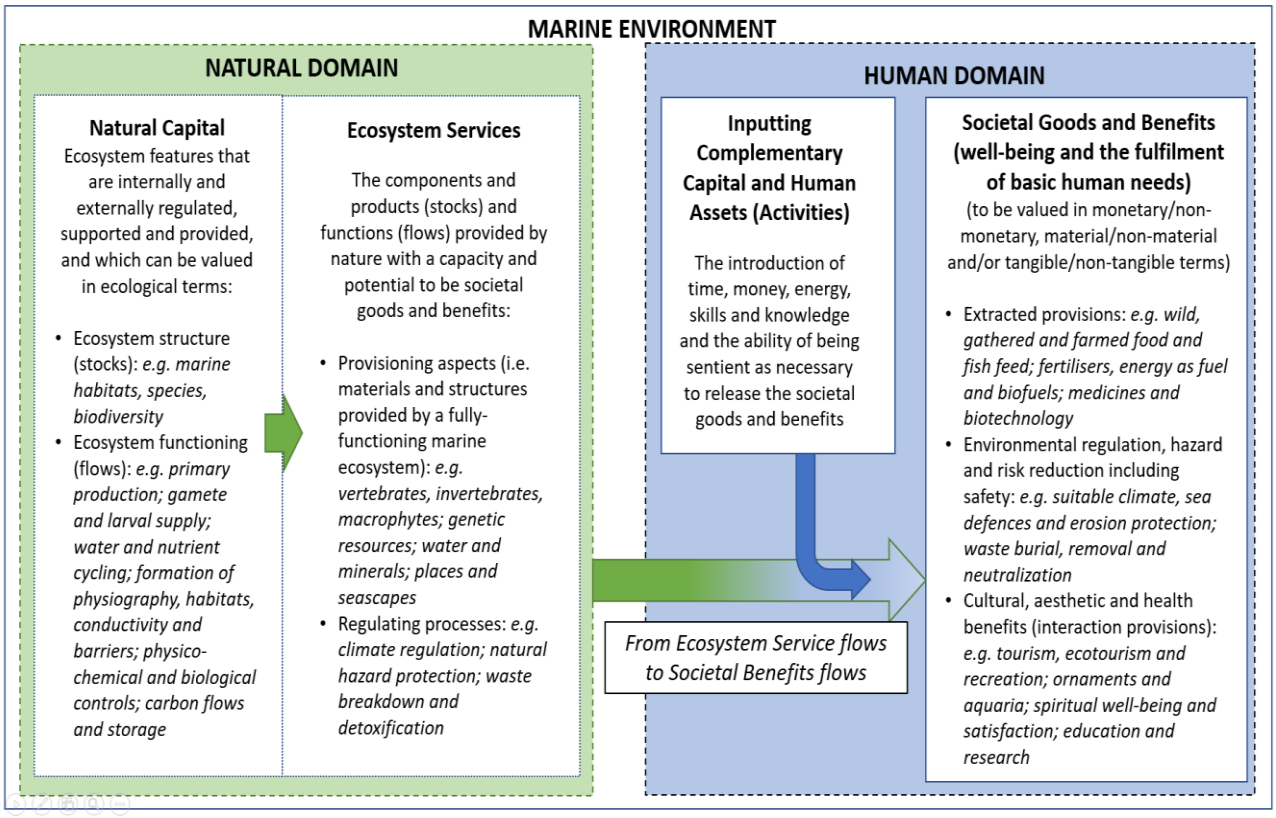

Figure 1: Natural capital, ecosystem services and societal benefits, including material goods, provided by marine ecosystems (Elliott, 2023).

2. Societal Benefits, Human Health and Wellbeing and the Economy

Societal benefits

Table 1 gives examples of 14 benefits derived from the marine environment (based on Turner et al, 2015). Consequently, the term societal benefits aims to be all-embracing by including, firstly, material 'goods', such as fertilisers and biofuels and food for consumption, and their monetised value can be measured by a price using an exchange value, i.e. such goods are frequently bought and sold in markets. Secondly, the term includes 'benefits' which constitute a more diverse set of entities, e.g. flood control and aesthetic and cultural benefits, both of which contribute to human welfare but their value may be less amenable to monetisation, i.e. they may not necessarily be traded. Although the term 'societal benefits' refers to the benefits to human health and wellbeing and economy derived from the natural environment, we might also refer to dis-benefits if impacts are detrimental.

The societal benefits are grouped into three types here on the RHS of Figure 1 but modified from the ecosystem services categorisation used by the Millennium Ecosystem Assessment (MEA, 2005), namely:

- Extracted provisions (called *provisioning* services in MEA (2005), which refers to these as the products obtained from the ecosystem);
- Environmental regulation, hazard and risk reduction including safety (called *regulating* services in MEA (2005), which refers to these as the benefits obtained from the regulation of ecosystem processes);
- Cultural, aesthetic and health benefits (interaction provisions) (called *cultural* services in MEA (2005) which refers to these as the non-material benefits people obtain from ecosystems; also including research and education).

The terminology has been changed given that the definitions used by the MEA (2005) appear to conflate both services and benefits (see Elliott, 2023). It is emphasised that by separating societal benefits (including material goods) from ecosystem services then the former can be used for the human aspects in marine ecosystem functioning and the cause-consequence-response relationships inherent in the social-ecological system; in contrast, the term ecosystem services is then reserved for the natural physico-chemical and ecological aspects. The term ecosystem services then implicitly includes so-called supporting services (sometimes referred to as intermediate services (Turner et al., 2015)), which are those services that are necessary for the production of all other ecosystem services but which do not yield direct benefits to humans; these have been identified as processes within the marine natural capital in Figure 1.

Table 1: Examples of societal goods and benefits from the marine and coastal environment (Burdon et al., 2024, and Turner et al., 2015).

Provisioning Goods/Benefits: Products obtained from the ecosystem	
Fertilisers and biofuels	Materials (biota) sourced from coastal and marine biota for consumption or industrial uses.
Food for human consumption	Extraction of coastal and marine biota (plants and animals) for human consumption.
Food not for human consumption	Extraction of biota not for human consumption e.g., animal fodder.
Genetic resources	Extraction of coastal and marine biota for genetic purposes.

Medicines and biotechnology	Extraction of biota to produce medicines, pharmaceuticals, etc.
Ornaments, aquaria and aquaculture	Extraction for decoration, fashion, handicraft, souvenirs, etc.
Materials	Materials used in the manufacture of goods.
Regulating Goods/Benefits: Benefits obtained from the regulation of ecosystem processes	
Drinking water	Supply of water sufficient quality for humans to consume.
Healthy climate	Maintenance to human well-being as a result of a healthy climate.
Flood control	Reduction in flooding related hazards.
Erosion control	Reduction in hazards from the prevention of coastal erosion.
Waste burial/removal/neutralisation	Contribution of biota to achieving policy standard related to waste levels in water by natural waste burial, removal, and neutralisation.
Cultural Goods/Benefits: Non-material benefits people obtain from ecosystems	
Aesthetic benefits	Appreciation of natural landscapes and seascapes.
Education, Research	Benefits for formal education, research and science.
Leisure, recreation, tourism	Benefits from recreation, leisure, and tourism driven by natural landscapes.
Spiritual and cultural well-being	Appreciation of culture, heritage, folklore, etc.
Human health	Human physical and psychological health benefits.

Ecosystem services (also see Briefing Paper *BP4: Marine Processes and Functioning and Ecosystem Services*)

Although ecosystem services have been long discussed in the literature (e.g., Daily, 1997; Constanza et al., 1997; De Groot et al., 2002; Elliott, 2023, and references therein), there is no agreed definition of the term ecosystem services, which can lead to confusion over the distinction between ecosystem services and societal benefits (Burdon et al, 2024). Here it is emphasised that by separating these terms, as in having separate Briefing Papers, then this confusion is eliminated. Consequently, as a working definition, ecosystem services can be simply regarded as:

"functions and products from nature that can be turned into benefits with varying degrees of human input" (UK Natural Capital Committee, 2019).

This definition emphasises that ecosystem services are different to societal benefits in referring to naturally occurring processes in the natural environment, i.e. in the absence of humans, ecosystem services would still be present in the natural environment. In contrast, societal benefits are secured from ecosystem services through the complementary input of capital (built, human and social) and human assets (an input of energy, time, money, skills, knowledge and the ability of being sentient) (Elliott, 2023) and are therefore associated with the human domain (as in Figure 1). Hence, ecosystem service flows act as the link between the Natural Capital that comprise the marine and coastal ecosystem and the benefits, and material goods, obtained by society that are valued through their impact on human health and wellbeing and on the economy.

Figure 1, and Elliott (2023) and Burdon et al (2024), place ecosystem services and societal goods and benefits within a modified version of the so-called cascade produced by the CICES framework (Haines-

Young and Potschin, 2018; Potschin et al., 2016). This emphasises that there is a central continuum (i.e. a cascade) from environmental physico-chemical structure and processes, through ecological structure and functioning, to ecosystem services and then to societal goods and benefits after inputting human capital and assets. Burdon et al. (2024) emphasises that individual societal benefits will depend upon an array of ecosystem services rather than being attributable to any single one, as interdependencies and backward linkages are characteristics of complex coastal and marine systems (Gregory et al., 2013). Secondly, that ecosystem services associated with one broad habitat type can be affected by changes in other habitats, and thirdly, that the interconnected nature of spatially separate components of the wider environment, highly mobile species and the role of the water column are particularly important considerations in coastal and marine habitats.

Complementary roles of capital and human assets

'Natural Capital' is regarded here as "*the elements of nature that directly or indirectly produce value to people, including ecosystems, species, freshwater, land, minerals, the air and oceans, as well as natural processes and functions*" (UK Natural Capital Committee, 2019). This recognises that coastal and marine ecosystems contain a range of components (e.g., habitats and species) and processes (e.g., food webs and ecological dynamics) which form the natural capital from which ecosystem services flow. These are shown as stocks and flows in Figure 1. However, given the above definition of societal benefits, and material goods, the use of 'indirectly or directly' implicitly refers to the input of human capital and assets. The literature commonly uses the terms human, built and social capital although this may be regarded as tautological as 'built' and 'social' are by definition related to humans – an example of the need for the language of this field to be standardised. For example, Shittu et al. (2021) combine all of these types of capital into human capital, whereas Berkes and Folke (1992) regard the roles of three types of capital (natural, human-built and cultural) as being complementary. Schuller (2001), in discussing the complementary roles of human, social and cultural capital, considers the anomalies and ambiguity (and even tautology) in the terms. Furthermore, it is of note that the literature does not use the term 'complementary capital' but rather indicates that the different types of capital have complementary roles.

Despite the varying terms used in the literature, here and in essence, the complementary types of capital can be taken to comprise: **built capital** - the material goods or fixed assets which contribute to the production process rather than being the output itself – e.g. fuel, tools, machines and buildings; **human capital** - the accumulated knowledge, skills and experience embodied in agents along with their motivations, health and commitment of time, and **social capital** – networks, norms and trust, and the way these allow agents and institutions to be more effective in achieving common objectives. The latter helps us maintain and develop human capital in partnership with others, e.g. families, communities, businesses, trade unions, schools, and voluntary organisations. The terms built, human and social capital have also included, respectively, physical capital, seed capital and cultural capital (Potschin et al., 2016).

As emphasised here, societal benefits, and material goods, are secured only by inputting these types of capital, including the human assets of time, energy, money, skills, knowledge and the ability to be sentient (Elliott 2023). However, in some cases, there are indirect relationships between such inputs and the realisation of benefits; for example, in carbon sequestration and storage in shelf sea sediments, and water storage and regulation in wetlands. In the model presented above (Figure 1), these are ecosystem services provided by the natural domain which only result in societal goods and benefits to humans inhabiting an area; however, it can be argued that ecosystem services such as carbon sequestration benefit humans worldwide if it reduces the adverse effects of climate change. As shown by Elliott (2023), adding capital and human assets constitute the range of human activities in the environment whereby these activities also generate employment opportunities and contribute to value added within the wider economy.

Using the example activity of fishing, the built capital is the trawler, gear, fuel, ice and port infrastructure employed to catch and preserve fish for processing which have all been manufactured and/or involve processing and hence require inputting time, money and energy. Technological change is likely to alter the characteristics of the employed built capital over time. Without these elements of built capital, a trawled catch of fish would not be fit at the time of landing for processing for, say, human consumption despite there being an abundance of fish in the sea.

An example of human capital and assets to secure benefits, and material goods, is the fisher such as the captain of a trawler choosing when, where and for how long to fish, the type of gear to employ, how to organise the crew, and so forth, where the captain draws from their accumulated knowledge, skills and experience, and decides their expenditure of time and energy to the activity.

Continuing the example relating to trawling, an example of social capital is the relationships between the trawler captain and the crew which, to function effectively, is based on trust and adherence to authority, or the cooperative relationships between members of the crew pursuing a collective endeavour. This example of fishing indirectly also includes the last of the list of human assets given above, the ability to be sentient, in the fisher and their customers being able to appreciate the benefits of fishing.

A more extensive list of complementary roles of capital may include **financial capital** as this enables the other types of capital to be owned, employed and traded (see UK Natural Capital Committee, 2019). Financial capital is exemplified by shares and banknotes (Forum for the Future, n.d.) although if insurance is included in this category then it has an important role in safeguarding the value of owned built capital and human capital against particular risks e.g., to protect the value an owner's investment in, say, a physical asset such as a fishing trawler from physical damage or loss, or to protect a worker (or their dependents) financially where there is potential for injury or death. Without the availability of such insurance, investment in the sector may be more difficult to secure and workers may be less willing to undertake more hazardous activities. If not distinguished separately, financial capital is subsumed within the term built capital.

The level of complementary application of capital can indicate sustainable levels of ecosystem services and thereby sustainable levels of societal benefits. For example, capital in the form of fishing effort can be at a level that sustains societal benefits associated with a fishery over time. However, if fishing effort exceeds the levels necessary to sustain the fishery, some societal benefits may be enhanced in the short term (for example, fish for human consumption and recreational fishing) but applying this level of capital may be detrimental to those same societal benefits in the longer term. Controlling those levels of application by regulatory bodies has been termed **institutional capital** (Platje, 2008).

Drivers (see also *BP3: Cause-Consequence-Response Chains – DAPSI(W)R(M)*)

The Drivers in the DAPSI(W)R(M) framework (Elliott et al., 2017) are "*related to basic human needs such as the need for food, energy, space, movement of goods, security or recreation*" and this definition informed the design of the Marine SABRES Social-Ecological System (Gregory, et al., 2023) and in turn the recommended indicators for the drivers. Drivers are important here as they require to be satisfied by activities employing human capital and assets to secure societal goods and benefits from ecosystem services. In the Marine SABRES Social-Ecological System, this is the justification for 'closing the loop' between 'impacts on welfare (goods and benefits)' and 'drivers' in the causal loop diagrams (Gregory et al., 2023).

The interpretation of drivers in Marine SABRES, including the choice of SMART indicators (Indicators which are Specific, Measurable, Achievable, Realistic and Timebound), is informed by Maslow's hierarchy of needs (Maslow, 1943). This hierarchy is typically depicted as a pyramid as in Figure 2, reflecting the universal needs of individuals in society as its base (levels 1 and 2 in Figure 2) and more acquired emotions at higher levels (levels 3, 4 and 5 in Figure 2).

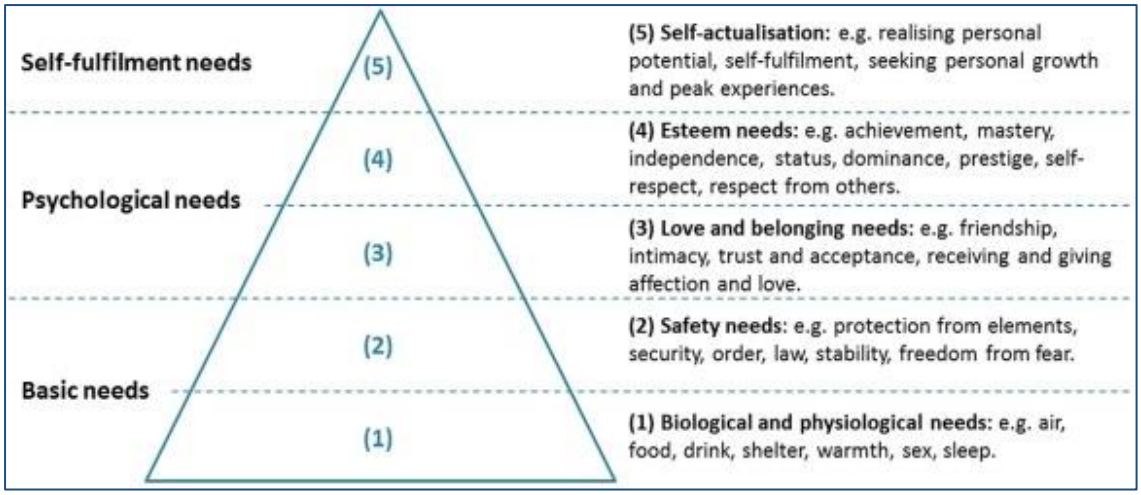

Figure 2: Maslow's hierarchy of needs and human welfare (from Elliott et al. (2017) adapted from Maslow, (1943)).

A further influence on our understanding, and representation through choice of indicators, of Drivers is the non-hierarchical taxonomy of fundamental human needs, and the ways in which these needs can be satisfied, given by Max-Neef (1989) with key aspects summarised in Table 2.

Table 2: A non-hierarchical scheme of Drivers (based on Max-Neef, 1989).

Human Needs	Being (Qualities)	Having (Things)	Doing (Actions)	Interacting (Settings)
Subsistence	Physical and mental health	Food, shelter, work	Feed, clothe, rest, work	Living environment, social setting
Protection	Care, adaptability, autonomy	Social security, health systems, work	Co-operate, plan, take care of, help	Social environment, dwelling
Affection	Respect, sense of humour, generosity, sensuality	Friendships, family, relationships with nature	Share, take care of, make love, express emotions	Privacy, intimate spaces of togetherness
Understanding	Critical capacity, curiosity, intuition	Literature, teachers, policies, educational	Analyse, study, meditate, investigate	Schools, family, communities
Participation	Receptiveness, dedication, sense of humour	Responsibilities, duties, work, rights	Cooperate, dissent, express opinions	Associations, parties, churches, neighbourhoods
Leisure	Imagination, tranquillity, spontaneity	Games, parties, peace of mind	Daydream, remember, relax, have fun	Landscapes, intimate spaces, places to be alone
Creation	Imagination, inventiveness, curiosity	Abilities, skills, work, techniques	Invent, build, design, work, compose, interpret	Spaces for expression, workshops
Identity	Sense of belonging, self-	Language, religions, work,	Get to know oneself, grow, commit oneself	Places one belongs to, everyday settings

	esteem, consistency	customs, values, norms		
Freedom	Autonomy, passion, self-esteem, open-mindedness	Equal rights	Dissent, choose, run risks, develop awareness	Anywhere

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