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# The 10-tenets of adaptive management and sustainability: An holistic framework for understanding and managing the socio-ecological system

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## ABSTRACT

The three basic principles of sustainable development, relating to ecology, economy and society, have long been embedded within national and international strategies. In recent years we have augmented these principles by a further seven considerations giving rise to the so-called 10-tenets of sustainable management. Whilst theoretically appealing, discussion of the tenets to date has been largely generic and qualitative and, until the present paper, there has been no formal and quantitative application of these tenets to an actual example. To promote the concept of successful and sustainable environmental management there is the need to develop a robust and practical framework to accommodate value judgements relating to each of the tenets. Although, as originally presented, the tenets relate specifically to management measures, they may also be applied directly to a specific development or activity. This paper examines the application of the tenets in both of these contexts, and considers their incorporation into an assessment tool to help visualise and quantify issues of sustainability.

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## 1. Introduction

### 1.1. Economic development and sustainability – where does sustainability lie?

Planners need to maximise economic development while achieving environmental sustainability (Elliott, 2011, 2014), satisfying the so-called Brundtland definition of sustainability for ‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs’ (WCED, 1987). This presents a conflict between the

opposing imperatives of growth and development, on the one hand, and ecological (and perhaps social and economic) sustainability on the other (e.g. Redclift, 2005). Such a conflict requires us to determine options for economic development and the likely associated impacts on sustainability (see Robinson, 2004). Consequently, planners need to determine the development path in a given area so that the local resources are used efficiently, the environment is protected and its economic welfare is promoted in a socially just way (e.g. Briassoulis, 1999; Gasparatos et al., 2008).

Successful sustainable development should reflect the three dimensions or pillars of sustainability: economics,

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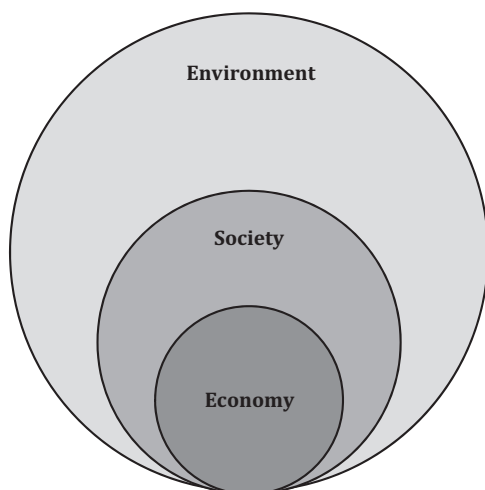
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society and the environment (e.g. Defra, 2012) seen as a ‘three-legged stool’ (e.g. Young, 1997) where all three dimensions are equally important. An alternative, but allied, paradigm views the three dimensions as three intersecting areas with the overlapping area representing overall sustainability. The underlying concepts for both models assume that each element (society, environment and economy) is equally weighted in determining sustainable action or policy. Irrespective of whether the concept of sustainable development is an oxymoron, Dawe and Ryan (2003) nevertheless suggested that the three-legged stool analogue is intrinsically flawed: the environment is not a leg for the sustainable development stool, but the floor upon which the stool must stand. They therefore suggest that the three dimensions of sustainability should be considered within a hierarchical model where economy is nested within society, and society nested within the environment (Fig. 1). This emphasises that environment is the single limiting factor that governs what is possible as regards the other two sustainability considerations.

## 2. Assessing sustainability

### 2.1. How can we recognise sustainability?

It was earlier suggested (Elliott, 2002) that the human response to anthropogenic changes in the marine system needed to be more successful via three tenets; that actions should be socially desirable, environmentally and/or ecologically sustainable, and economically viable. These three tenets have long been cited in national and international strategies and reflect the three principles or dimensions of sustainability. These, together with a further three tenets – that actions should be technologically feasible, legally permissible and administratively achievable – were suggested as necessary to achieve successful, marine environmental management. In addition, the socially desirable tenet was expanded to include ‘socially tolerable’. For example, we may not actively desire our waste to be discharged into the sea but we tolerate it as a cost-effective means of disposal.



**Fig. 1 – The hierarchical relationship of the three principle dimensions of sustainability.**

Subsequently, Elliott et al. (2006) proposed a seventh tenet (that actions should be politically expedient) reflecting the view that, irrespective of compliance against the first six tenets, without political support management responses may have no realistic chance of implementation.

Finally, Elliott (2013) suggested that a further three tenets (relating to cultural, ethical and communication issues) should be added for sustainable and successful management measures or responses to anthropogenic change (Table 1). Subsequently, these were explored in relation to risk assessment and risk management (Cormier et al., 2013; Elliott et al., 2014a). By fulfilling the tenets, the management of an environmental problem will be sustainable, protect the environment and be pragmatic (Elliott and Cutts, 2004), especially where the economic imperative is paramount, and will be societally more acceptable, encouraged and visible.

As presented previously (Elliott, 2013) most of the tenets reflect the importance of society and economy rather than the environment within the concept of sustainability. Moldan et al. (2012) suggested that, while sustainability denotes a particular property of the system, sustainable development is ensured by two key ideas. Firstly the Brundtland definition of development (WCED, 1987) and secondly Article 1 of the Rio Declaration (UNCED, 1992) that humans ‘are at the centre of concerns for sustainable development [and] are entitled to a healthy and productive life in harmony with nature’. Both of these ideas reflect an anthropocentric view and emphasise the societal aspects of development. Similarly, in their original

**Table 1 – The 10-tenets for successful and sustainable environmental management (after Elliott, 2013).**

Environmental management should be:

Socially desirable/tolerable: environmental management measures are as required or at least are understood and tolerated by society as being required; society regards the measures as necessary

Ecologically sustainable: measures will ensure that the ecosystem features and functioning and the fundamental and final ecosystem services are safeguarded

Economically viable: a cost-benefit assessment of the environmental management indicates (economic) viability and sustainability

Technologically feasible: methods, techniques and equipment for ecosystem and society/infrastructure protection are available

Legally permissible: there are regional, national or international agreements and/or statutes which will enable and/or force the management measures to be performed

Administratively achievable: the statutory bodies such as governmental departments, environmental protection and conservation bodies are in place and functioning to enable successful and sustainable management

Politically expedient: the management approaches and philosophies are consistent with the prevailing political climate and have the support of political leaders

Culturally inclusive: local customs and practices are protected and respected

Ethically defensible (morally correct): the wishes and practices of individuals are respected in decision-making

Effectively communicable: all horizontal links and vertical hierarchies of governance are accommodated and decision-making is inclusive

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