SOCIAL-ECOLOGICAL SYSTEMS CONCEPTUAL OVERVIEW (incl. CULTURAL ECOSYSTEM SERVICES)

Jeffrey Thomas, Director

Timber, Fish & Wildlife Program

Puyallup Tribe of Indians

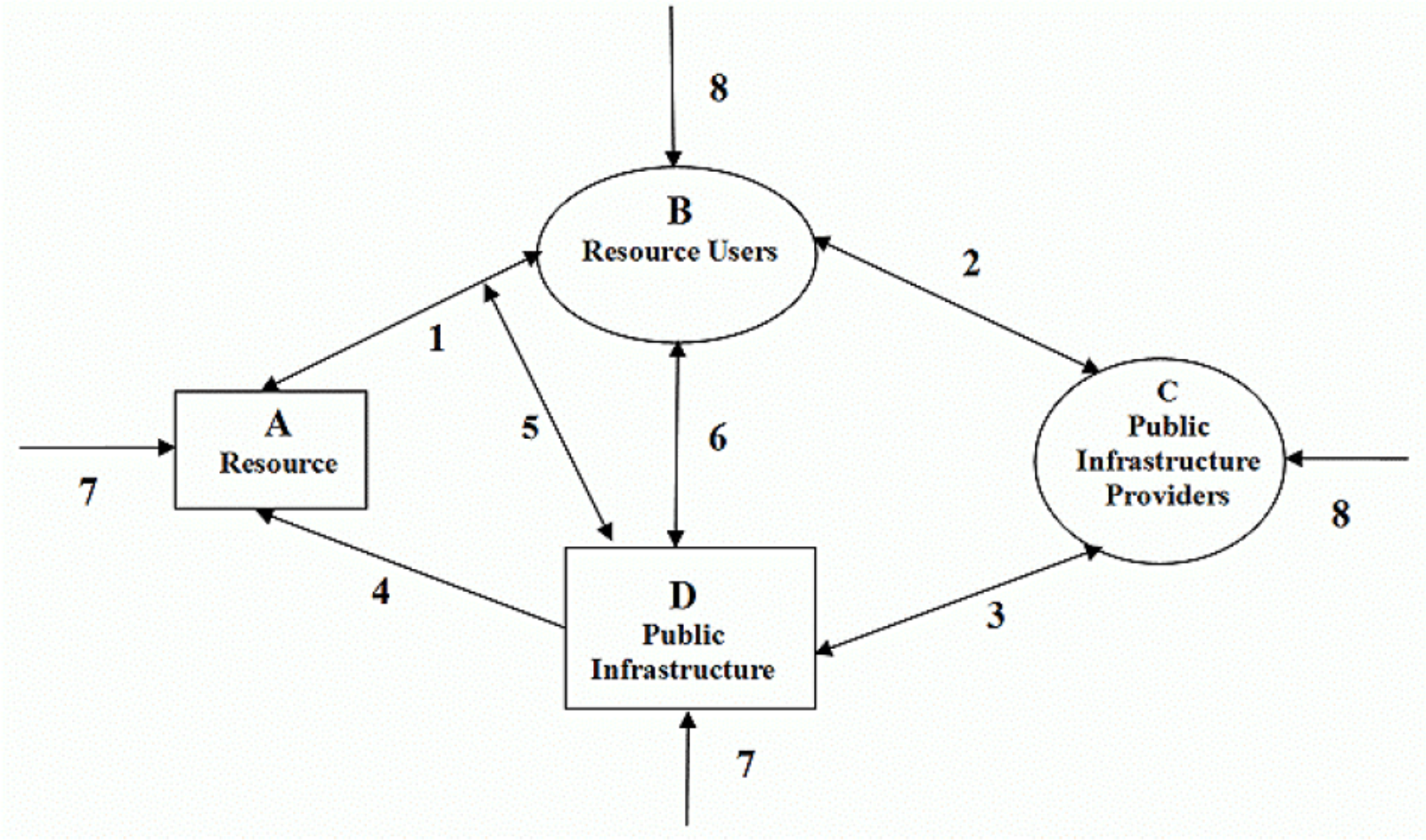
Tacoma, Washington

jeffrey.thomas@puyalluptribe.com

253-405-7478/cell 253-680-5565/office

Anderies et al (2004)

Fig. 1. A conceptual model of a social-ecological system.



Force and Machlis (1997)

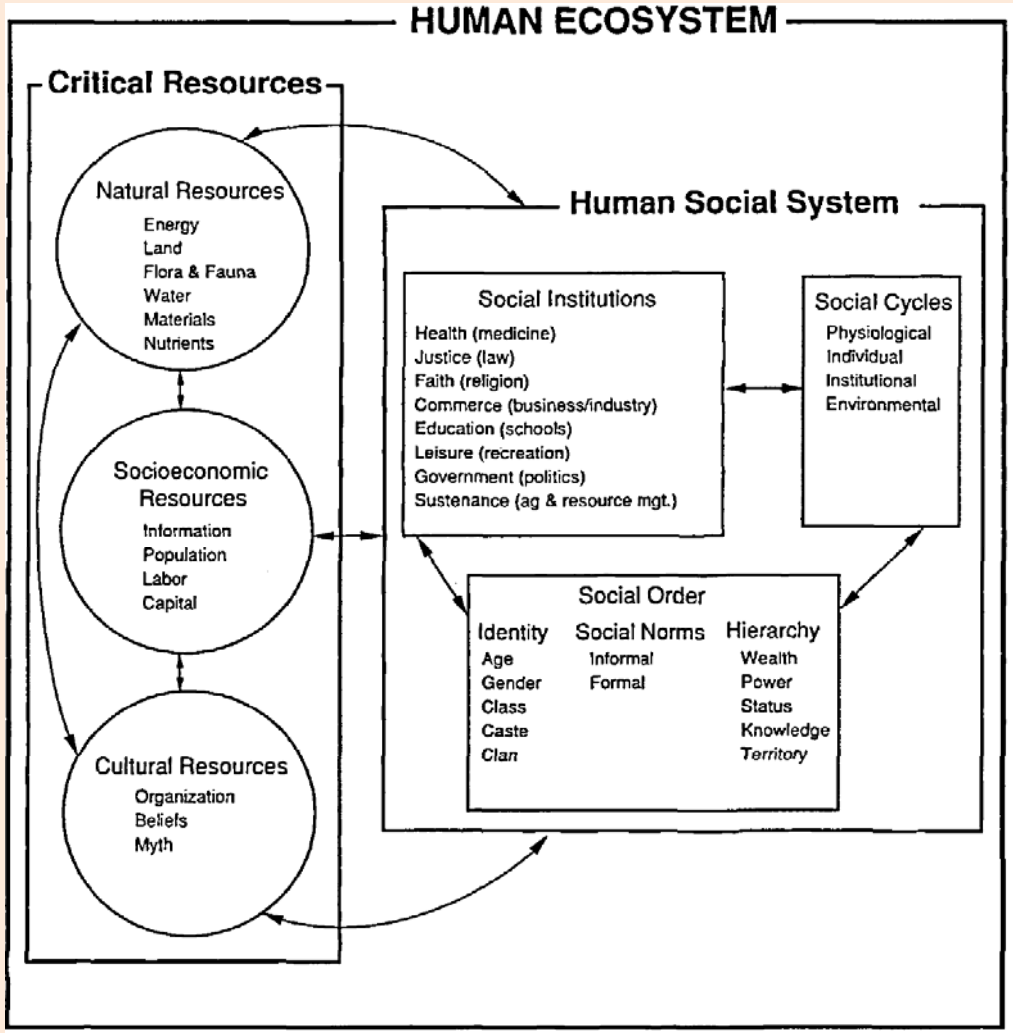
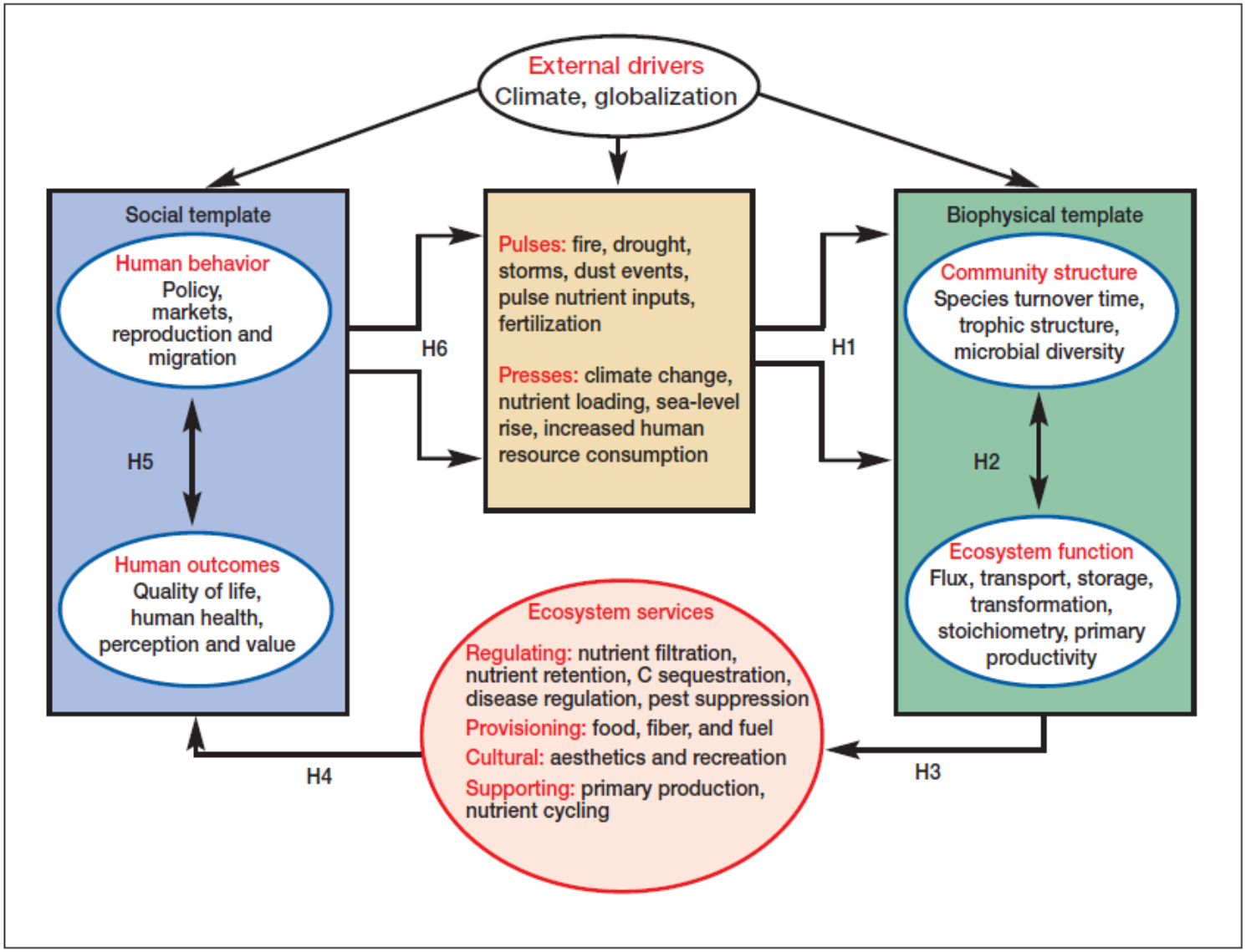


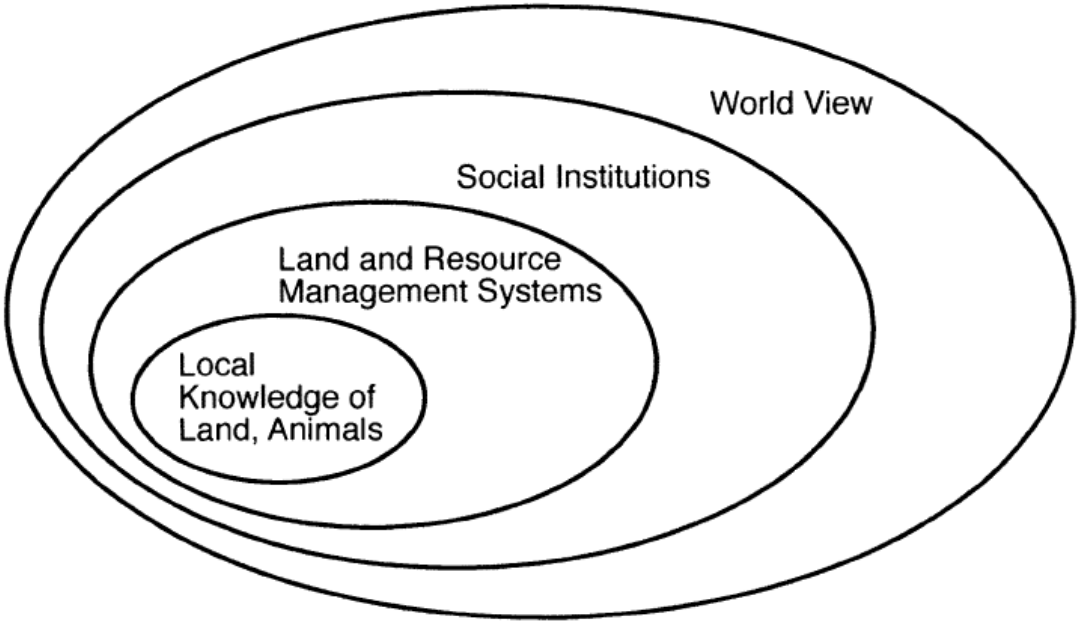
Figure 1. Working model of the human ecosystem.

Collins et al (2010)



Berkes et al (2000)

FIG. 1. Levels of analysis in traditional knowledge and management systems (adapted from Berkes 1999).



Burger (2010)

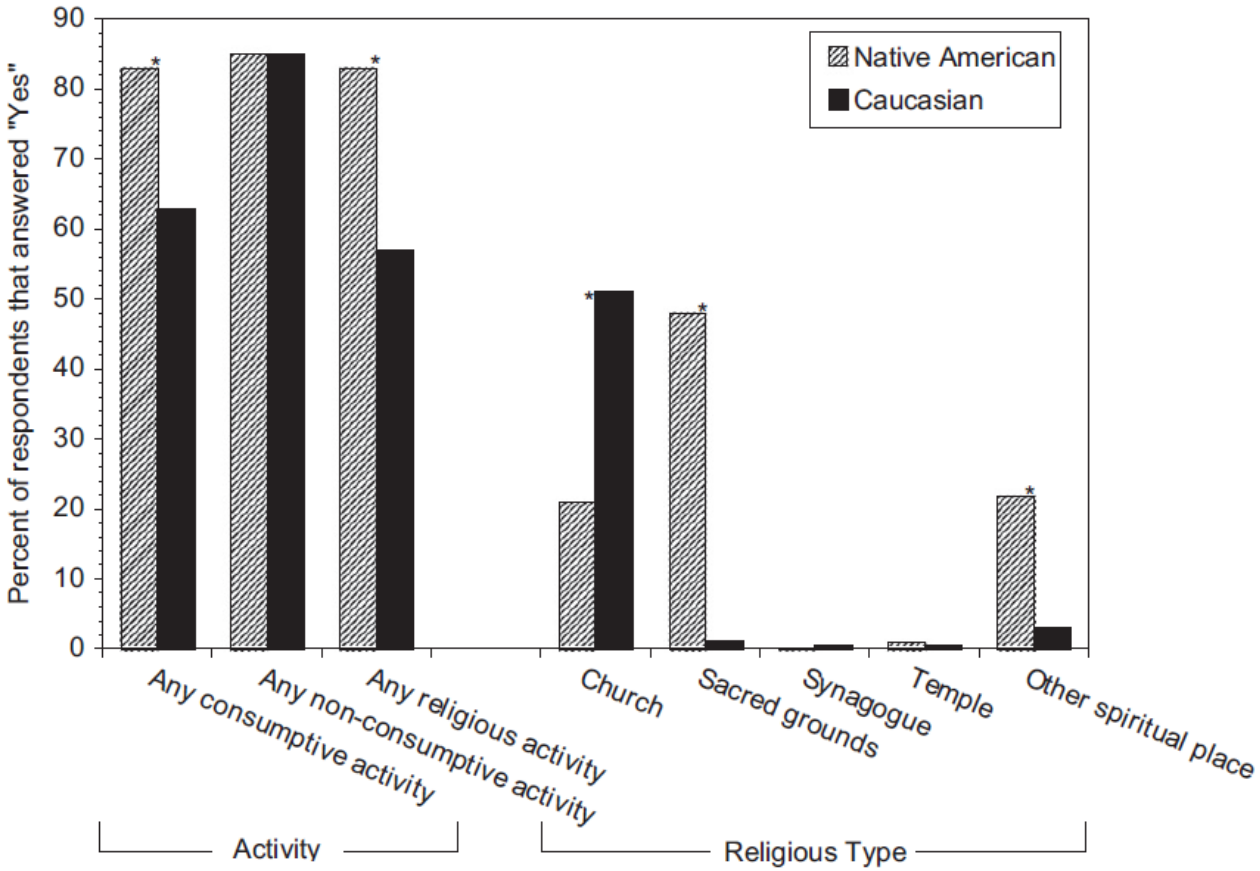


Fig. 2. Percent of respondents engaging in different types of activities, and the types of religious/sacred activities engaged in, as a function of Ethnicity (Native American and Caucasian).

Burger et al (2008)

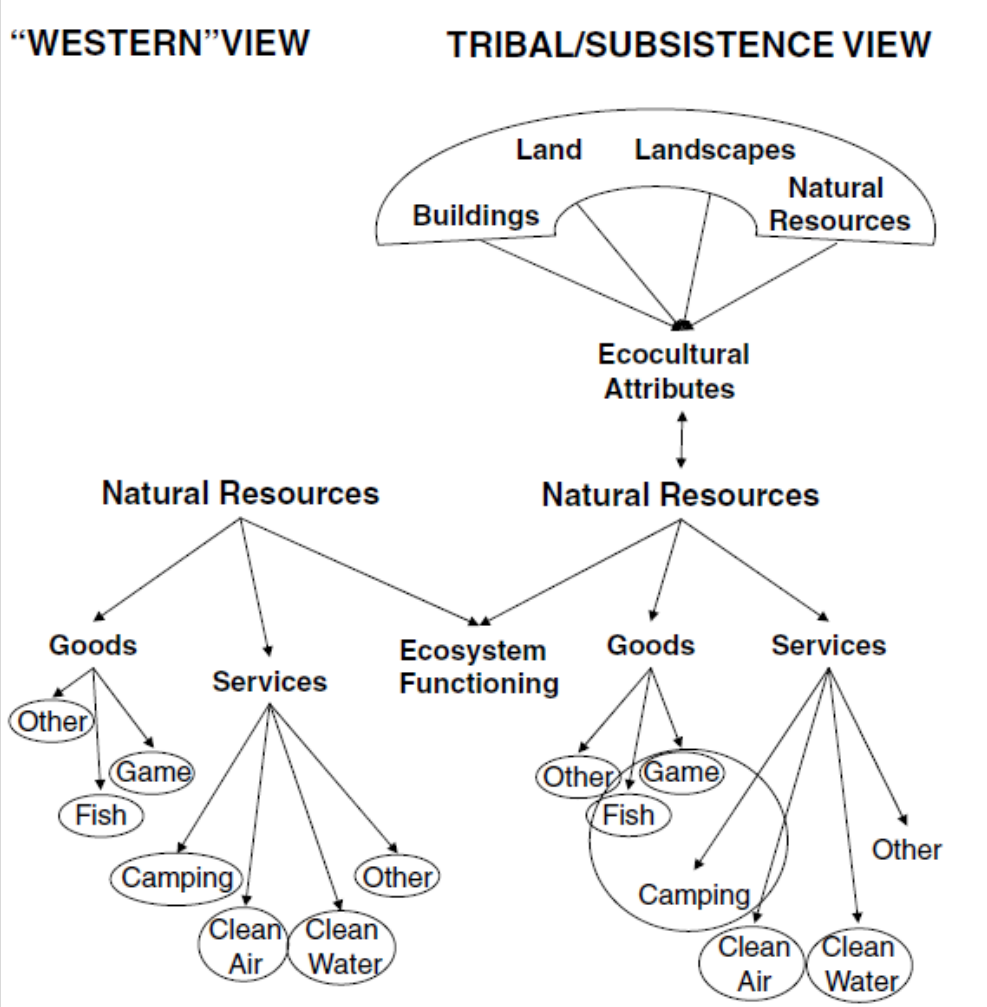


Fig. 1. Schematic of a "Western" view of what is provided by natural resources, and a subsistence and tribal view.

Chan et al (2012)

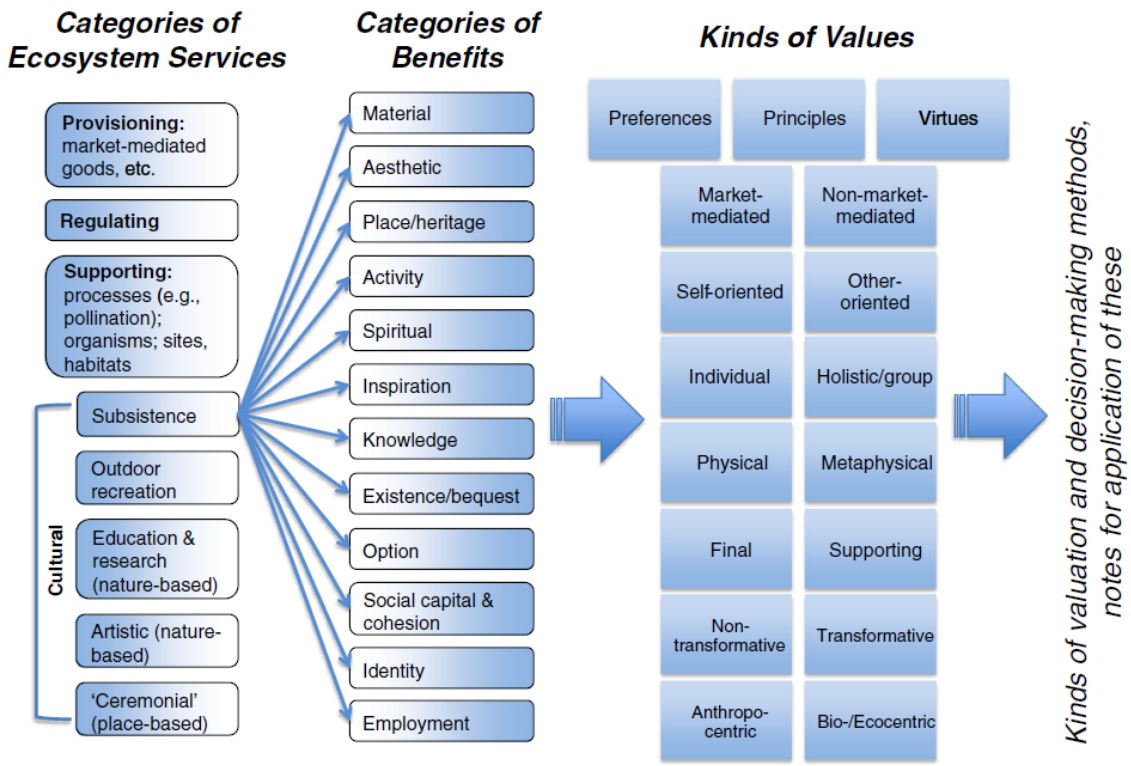


Fig. 1. The suggested use of the typologies of ecosystem services and values (reprinted with modifications from Chan et al., 2011): identify the relevant categories of ecosystem-derived benefits and services; connect the services and benefits, based on local expertise and/or participation; connect the benefits to kinds of values; use the kinds of values at stake to inform choice and application of valuation and decision-making methods—to ensure appropriate representation of the full range of relevant values and to avoid double-counting. The particular categories of services and benefits are only one example (categories are context-dependent—see text), and the arrows linking subsistence to categories of values are just one example of a mapping of one service onto benefits (other mappings are certainly possible). Note that the service names are shorthand (e.g., it should be "*provision of* market-mediated goods"), and that individual services like 'subsistence' do not fit cleanly within a single master category.

Kofinas and Chapin (2009)

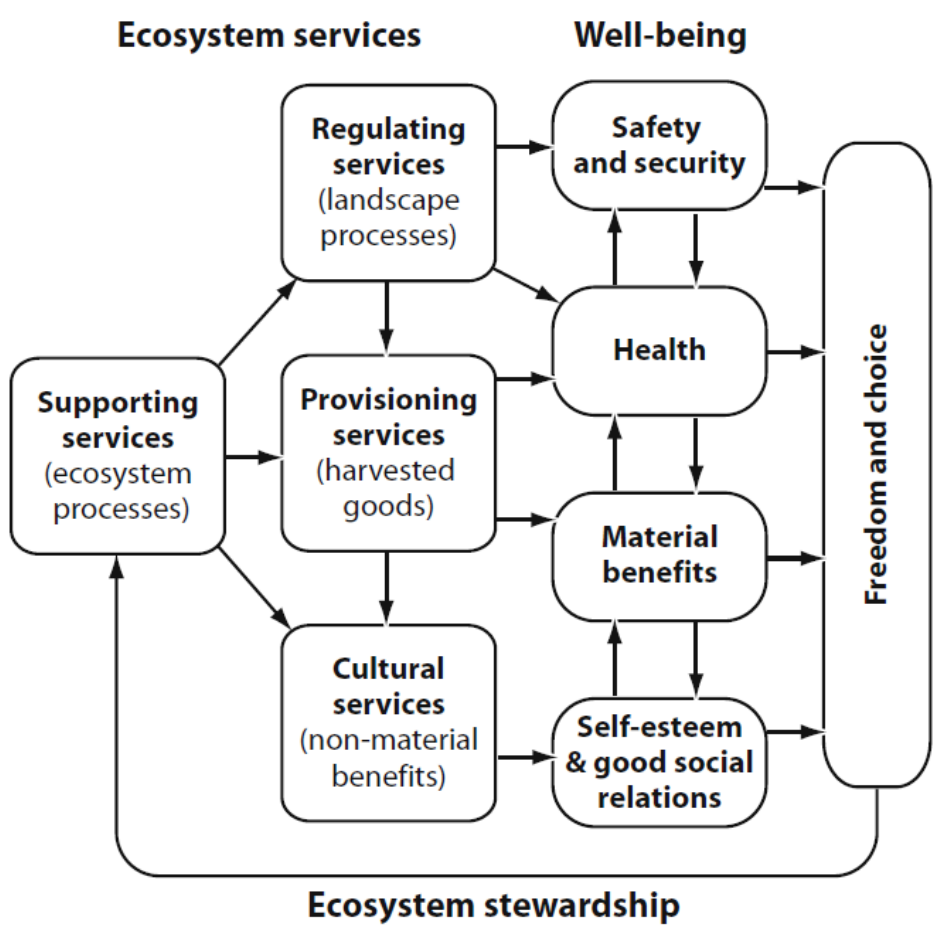
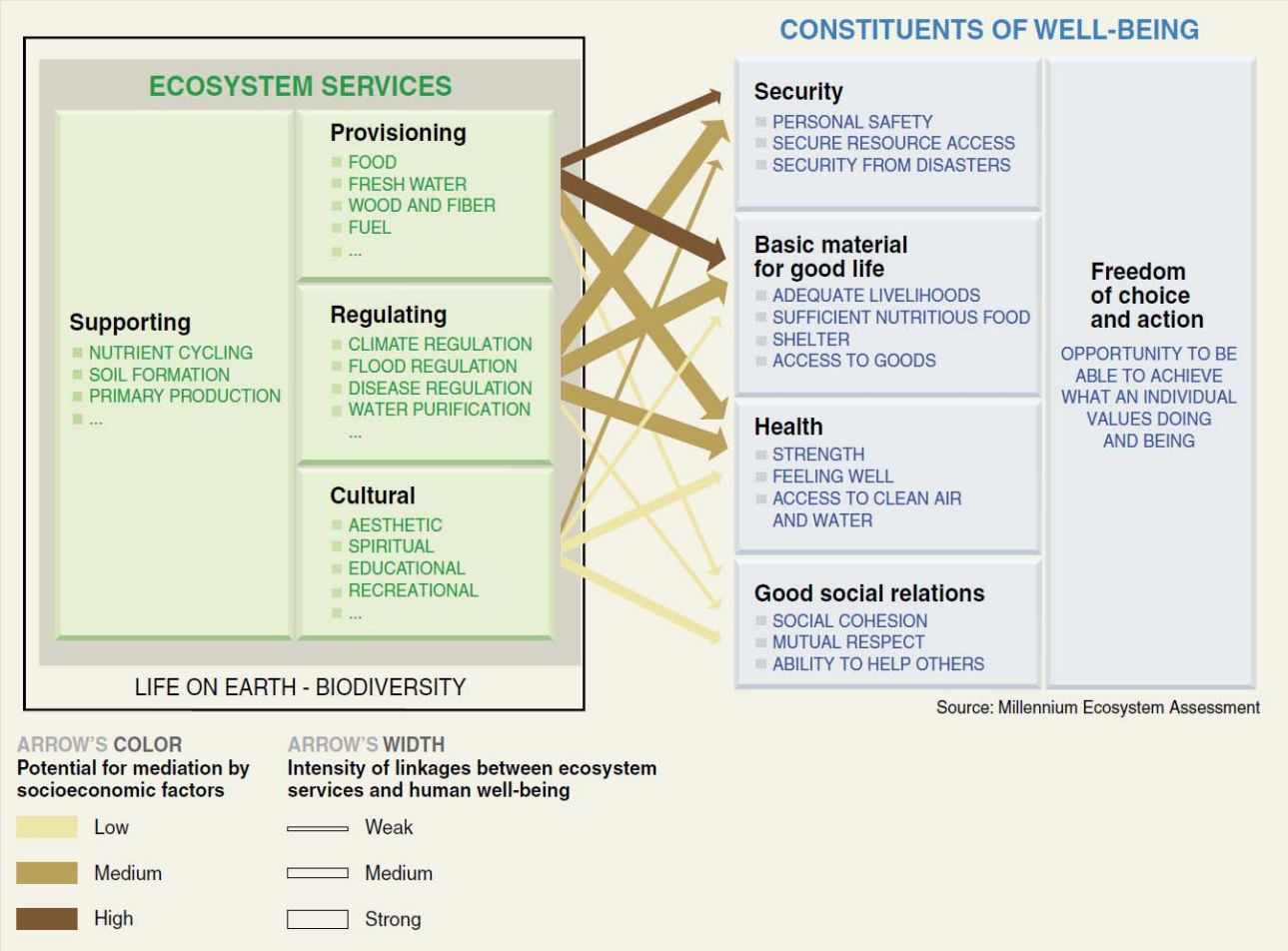


FIGURE 3.2. Relationship between ecosystem services and well-being. Adapted from the framework developed by the Millennium Ecosystem Assessment (MEA 2005d).

Millenium Ecosystem Assessment (2005)



Myers and Patz (2009)

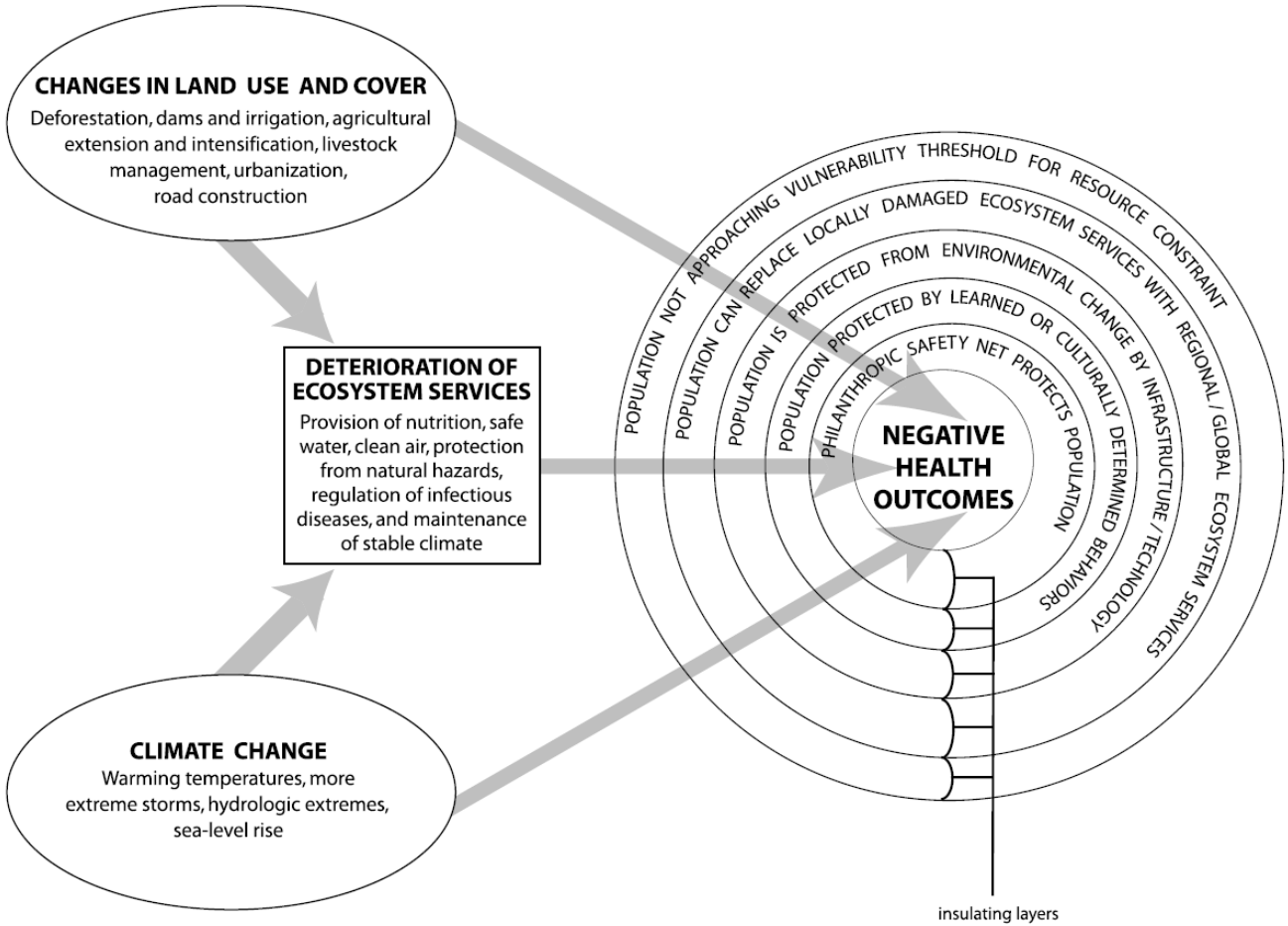


Figure 1

A schematic of the complex relationships between altered environmental conditions and human health. Drivers of global environmental change (e.g., land-use change or climate change) can directly pose health risks or impair ecosystem services that subsequently influence health. For hazards that affect human health, however, exposures will be modified by multiple layers of social or infrastructure barriers that can buffer or eliminate risk. Together, all components must be considered to achieve realistic assessments of population vulnerability.

Pollnac et al (2006)

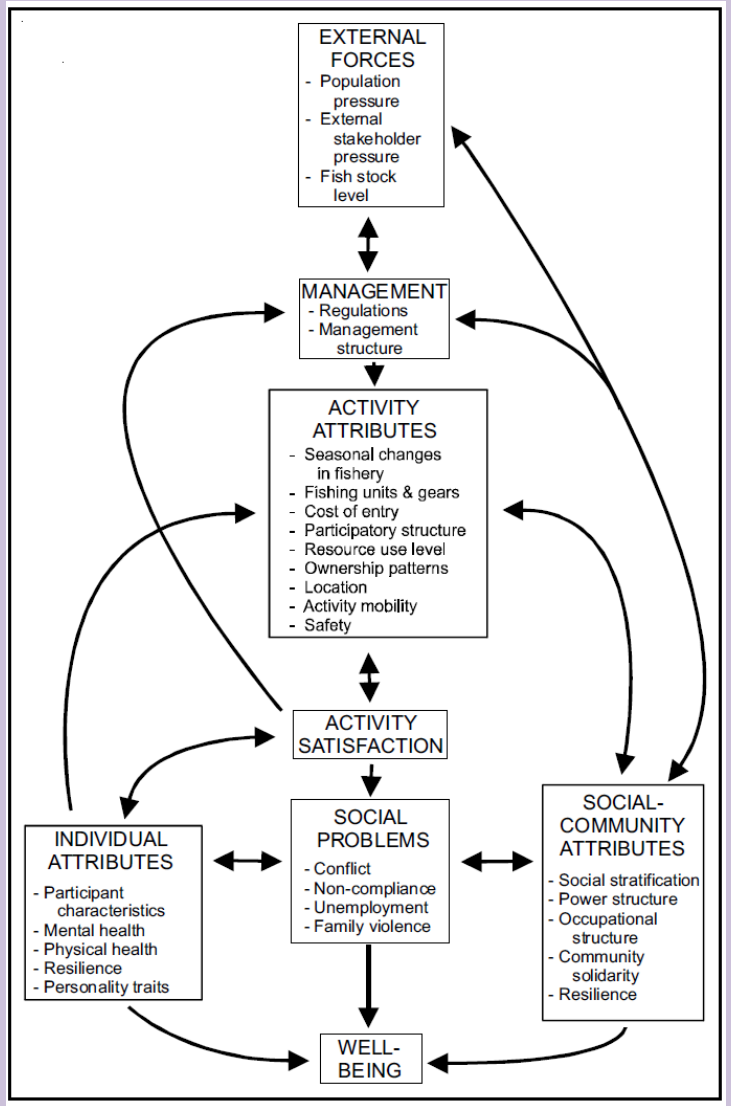


Figure 2.—Simplified fishery SIA model with selected indicators.

Pollnac et al (2009)

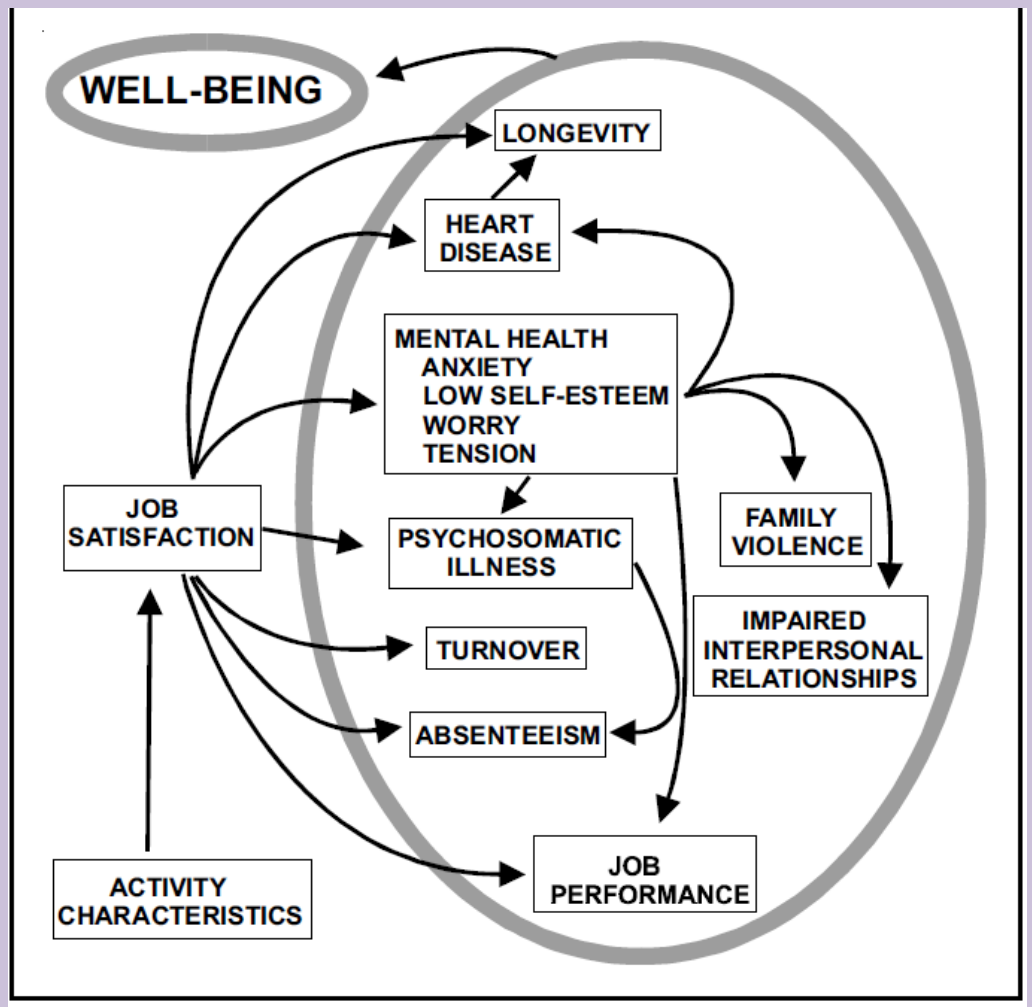


Figure 3.—Impacts of job satisfaction.

Kofinas and Chapin (2009)

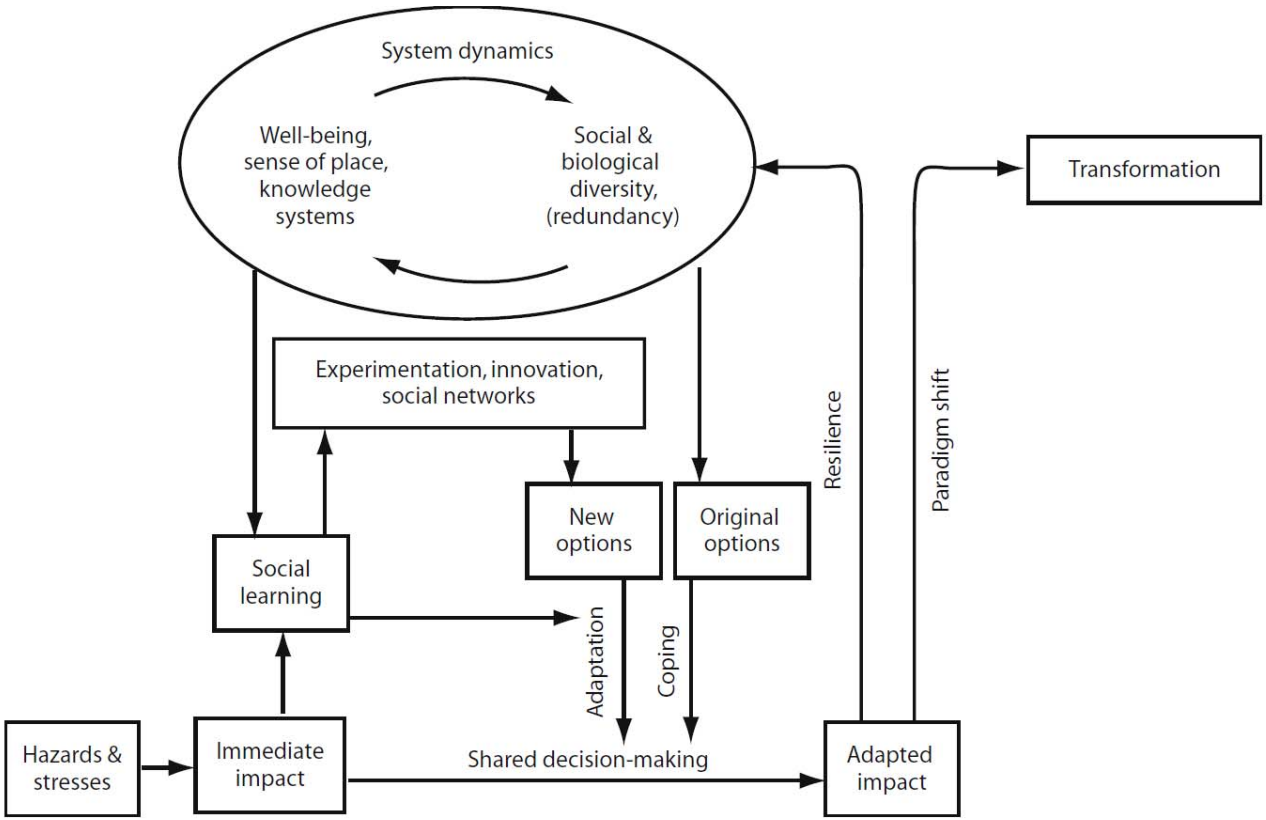


FIGURE 3.5. Components of adaptive capacity and resilience. Adaptive capacity depends on capacity to cope with the normal range of variation in hazards and stresses and the capacity to adapt through social learning, experimentation, and innovation.

Tipa and Nelson (2008)

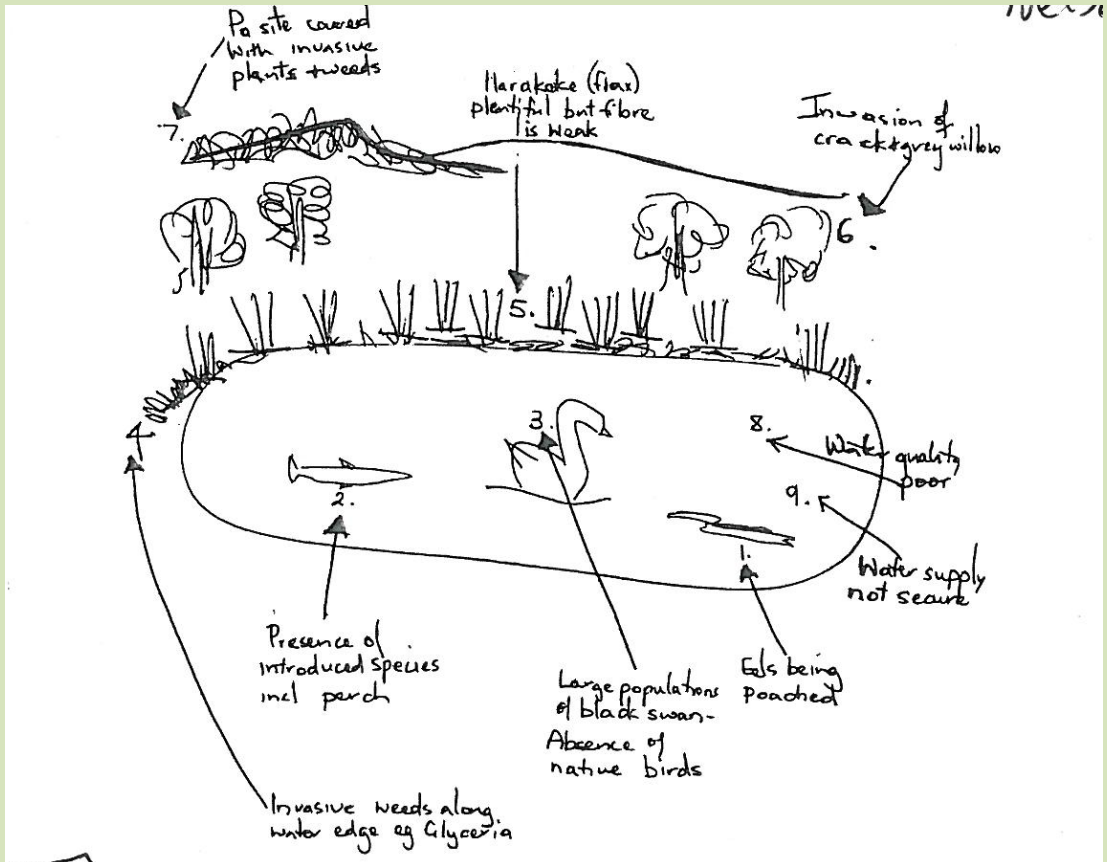


Figure 3. A sketch of issues associated with a site of significance in the Taieri catchment that threaten to deny cultural opportunities.

Boyd and Charles (2006)

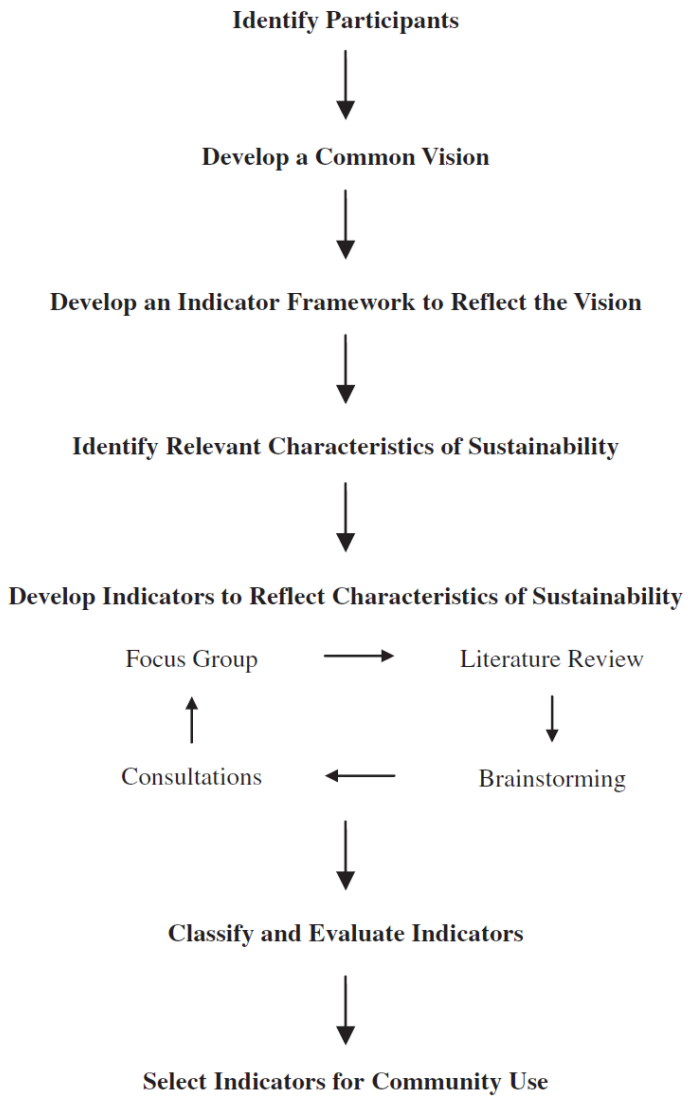


Fig. 1. The sustainable development indicator design process.

Tipa (2009)

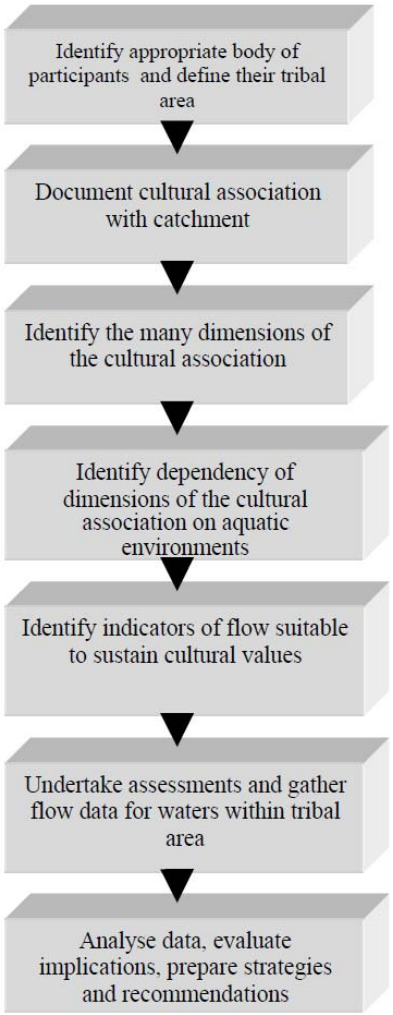


Figure 3. An adaptation of the Sustainability Assessment Method that was used to document the cultural association with a catchment.

Tengberg et al (2012)

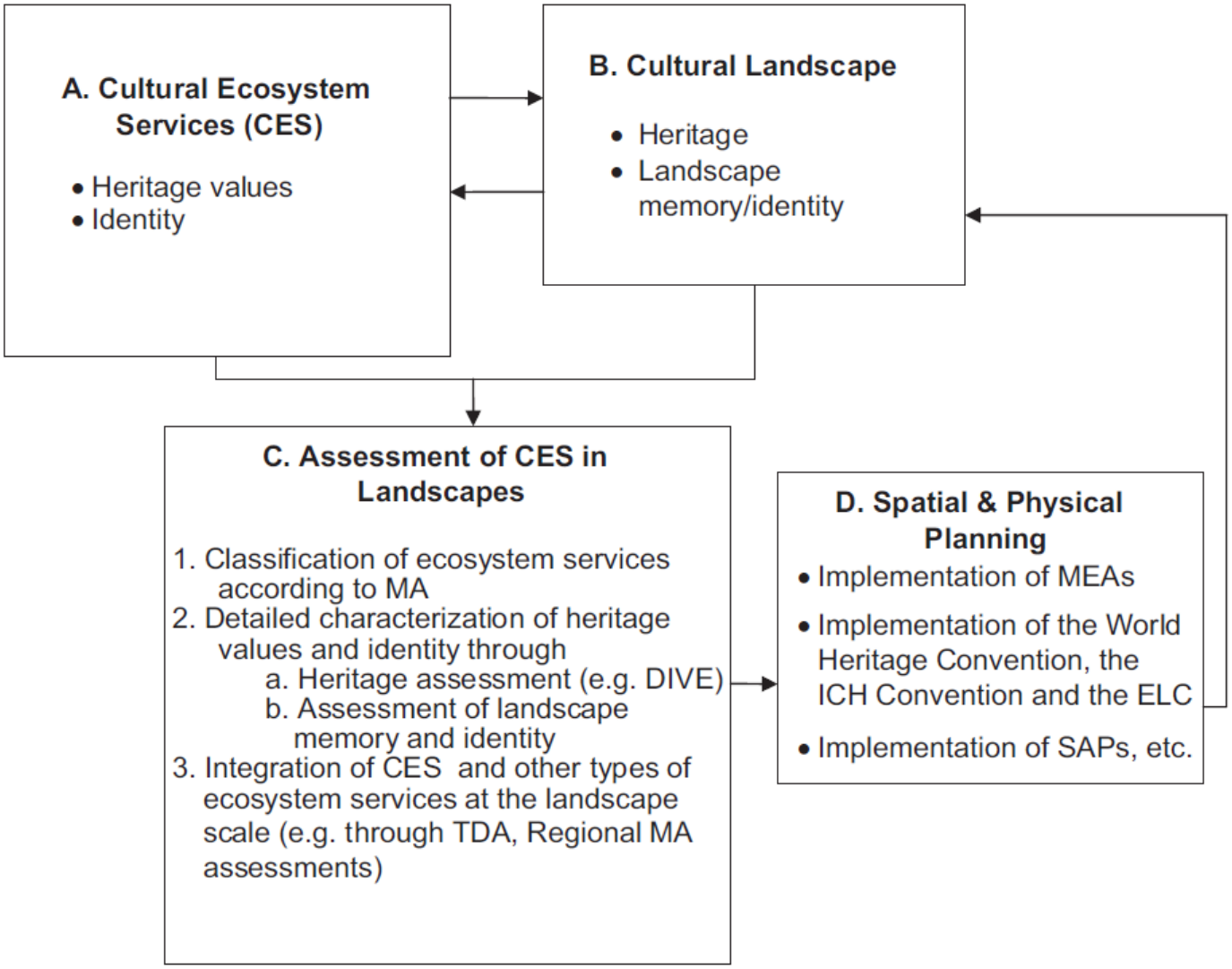


Fig. 1. Conceptual model of the linkages between Cultural Ecosystem Services and Cultural Landscape research.

Burger et al (2008)

Table I. A Partial List of Goods and Services Ecosystems Provide as Commonly Viewed by Western Scientists (Developed from Bingham *et al.*,[23] Harris & Harper,[6] Costanza *et al.*,[21] Burger,[76]; deGroot *et al.*,[77] Folke, [22] Reagan,[73]), and Those Proposed for Ecocultural Values

Goods	Services	Ecocultural Attributes
*Fish for fishing	*Clean air	*Clean and functioning habitats as components of cultural and social sacred grounds or monuments
*Game for hunting (including marine mammals in case of the Aleuts)	*Clean water	Intact ecosystems, free of noise and disturbances for cultural and social sacred grounds or monuments
*Herbs for medicine or religious activities	Buffers for coast lands against storms and hurricanes	*Plants, rocks, or animal parts for tools, clothing, or shelter
Plants for gardens	Trees for windbreaks against strong winds	**Clean and functioning ecosystem so that Native Americans could reoccupy their traditional homelands or fishing/hunting grounds at some point in the future[a]
Wood for lumber	Bees and other insects for pollinators	
*Fruits and nuts for consumption	Interesting plants, wildlife, scenes, or other aspects for photography, tourism, ecotourism, resorts	Soil sufficiently clean that it can be used in facial markings, body paints, and ceramics
Sap for maple sugar	Clear water and terrestrial environments for recreation	Game for ceremonies (such as rattlesnakes for the Hopi rattlesnake dance)
Fish and algae for fish aquariums	Bats, birds, and other animals for seed dispersal	*Free from the fear that fish and game are contaminated, that ceremonial, burial, or other sacred grounds are contaminated and have lost value because of degradation
Soil, gravel, rocks, or other materials for roads, gardens, or other construction	Climate regulation	
Plants for grazing livestock	Soil formation and erosion control	
Plants for pharmaceuticals	Biological control of pests	
	Reservoir for biological diversity	
	Existence values	

Note: Existence values as part of ecosystem services is separated from the other services because it begins to approach the ecocultural values component of environmental assessment that we are proposing. An asterisk (*) means it is important to the Aleuts as expressed in public and private meetings in their villages and in Anchorage.

Amberson (2013)

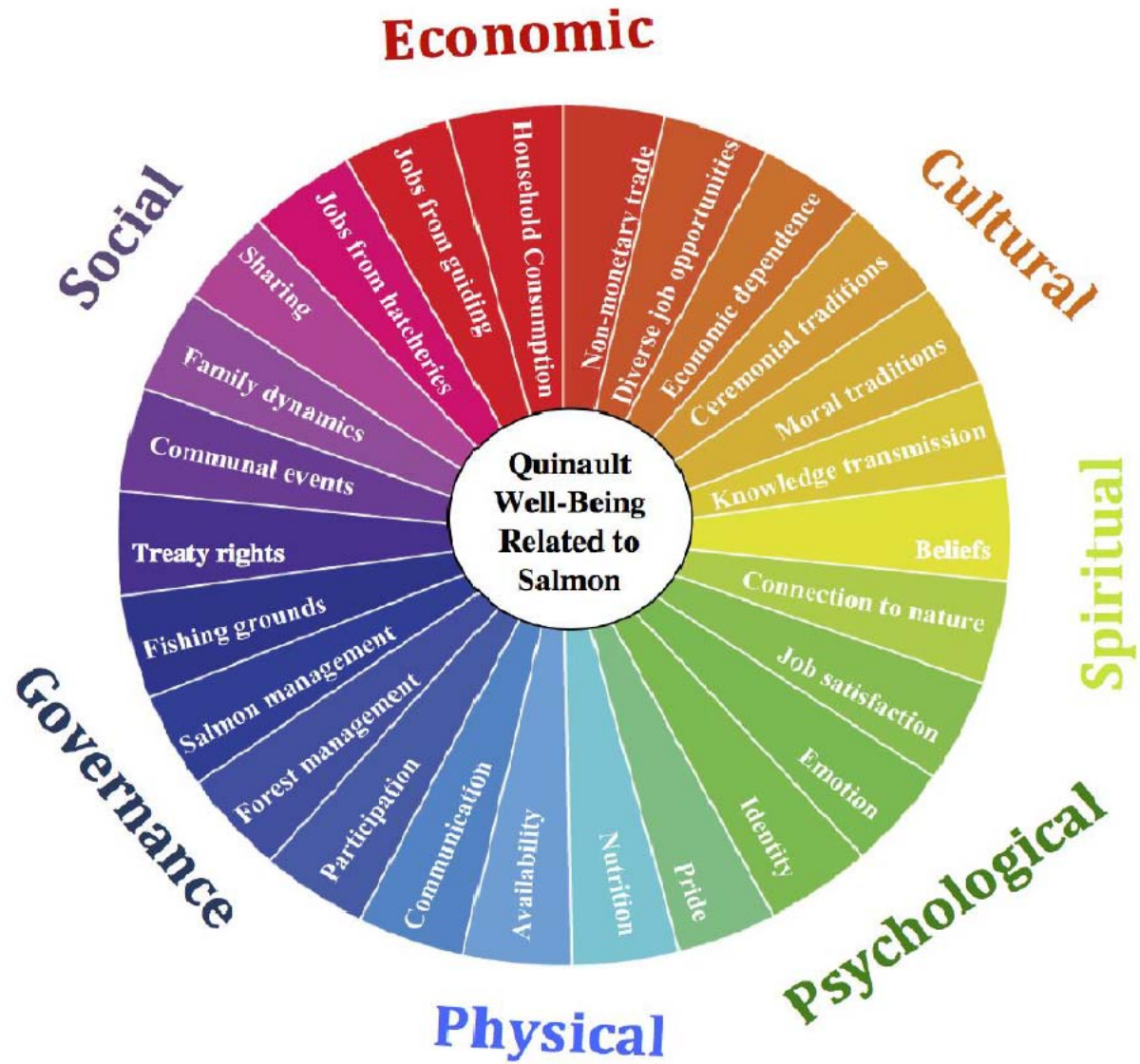


Figure 3. Quinault well-being related to salmon. Seven domains with 29 attributes.

Stafford-Smith et al (CKF 2009/Ch. 8)

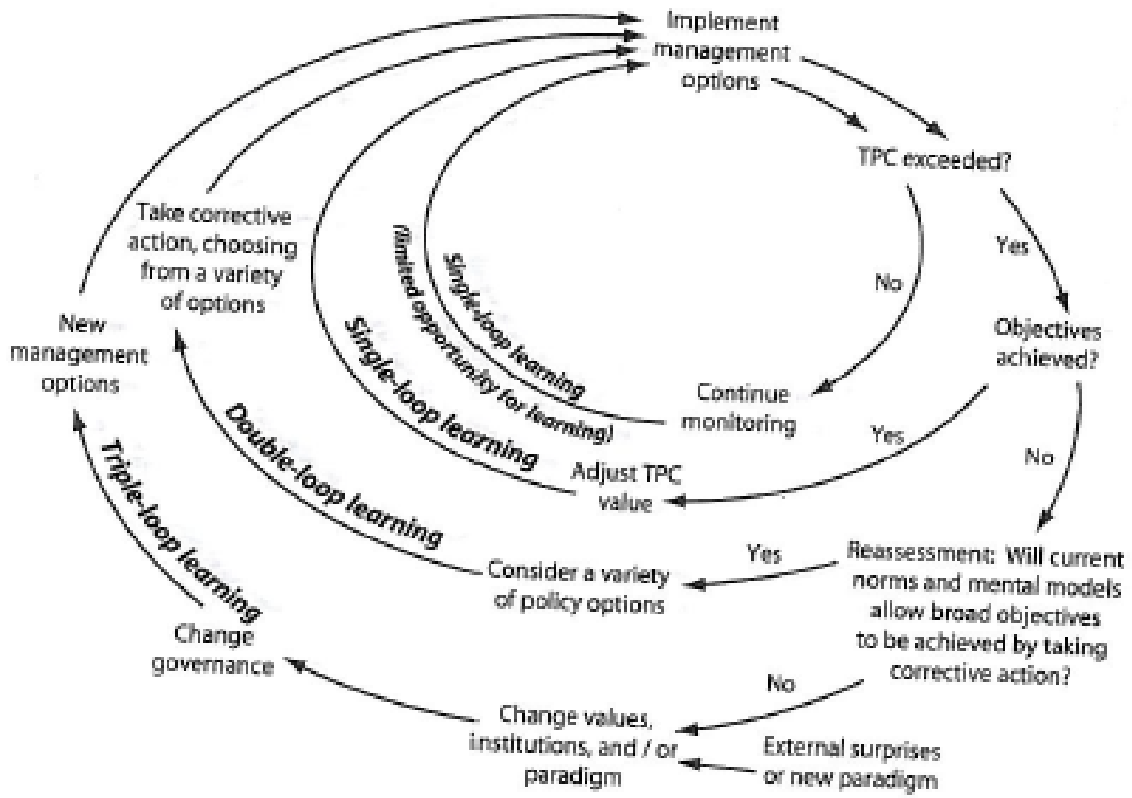


FIGURE 8.8. Strategic approach to river management that integrates indicators, endpoints, and values in the Kruger National Park. Thresholds of probable concern (TPCs) define the acceptable levels of heterogeneity. If the system remains within these limits, monitoring continues. If management objectives are met despite the TPC being exceeded, the threshold value is changed, but monitoring continues. If the TPC is exceeded and management fails to meet its objectives, a more fundamental reassessment occurs, leading to a modification or invention of new management strategies. Sometimes this reevaluation leads to an entirely new paradigm or new understanding, especially if the process has been triggered by unexpected events or is considered in the context of a new paradigm. These more fundamental reevaluations often require a change in governance, involving new sets of actors (Biggs and Rogers 2003). See also Fig. 5.1 on single-, double-, and triple-loop learning.

McCreary et al (2001)

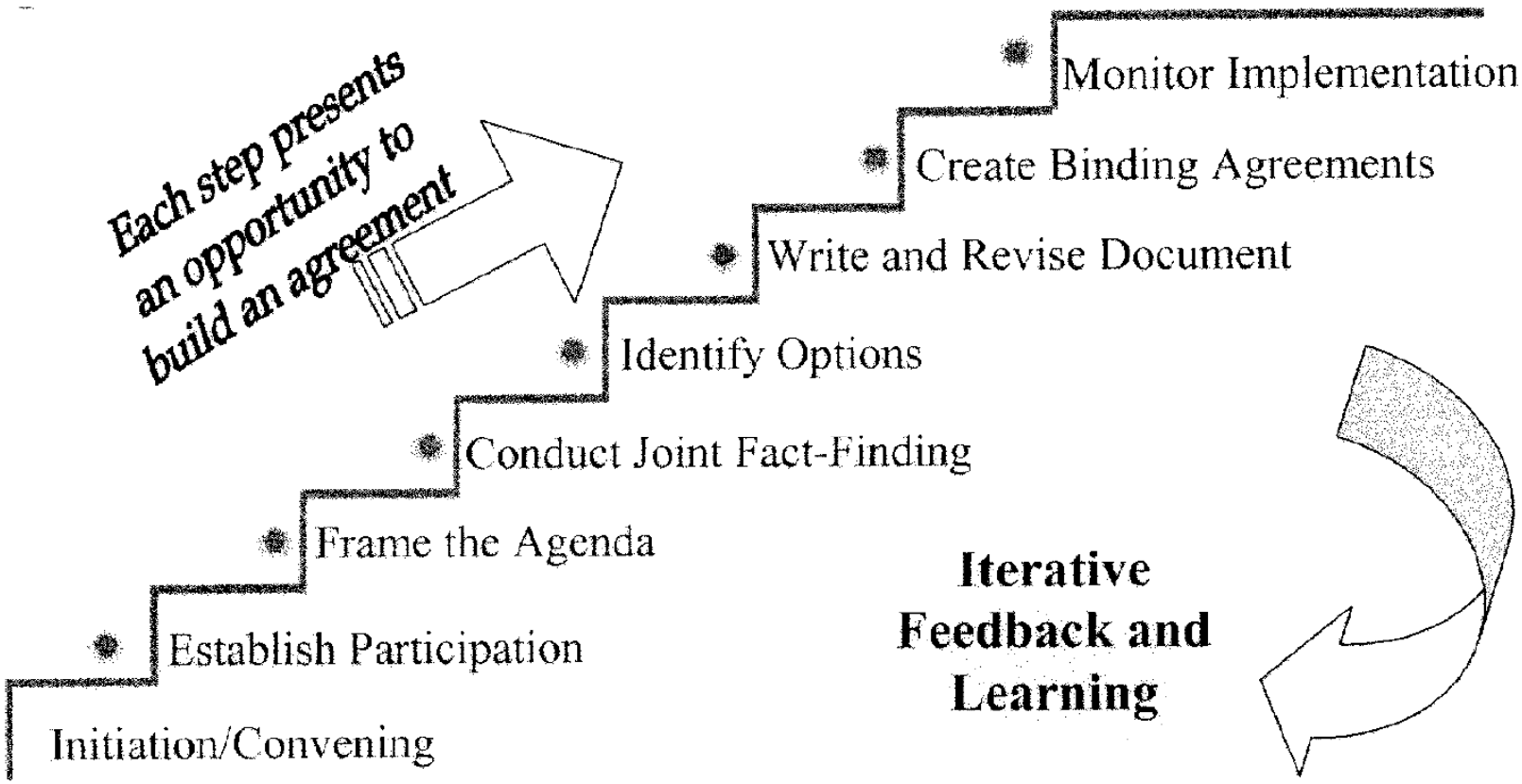


Figure 1. The stepwise agreement building model.