

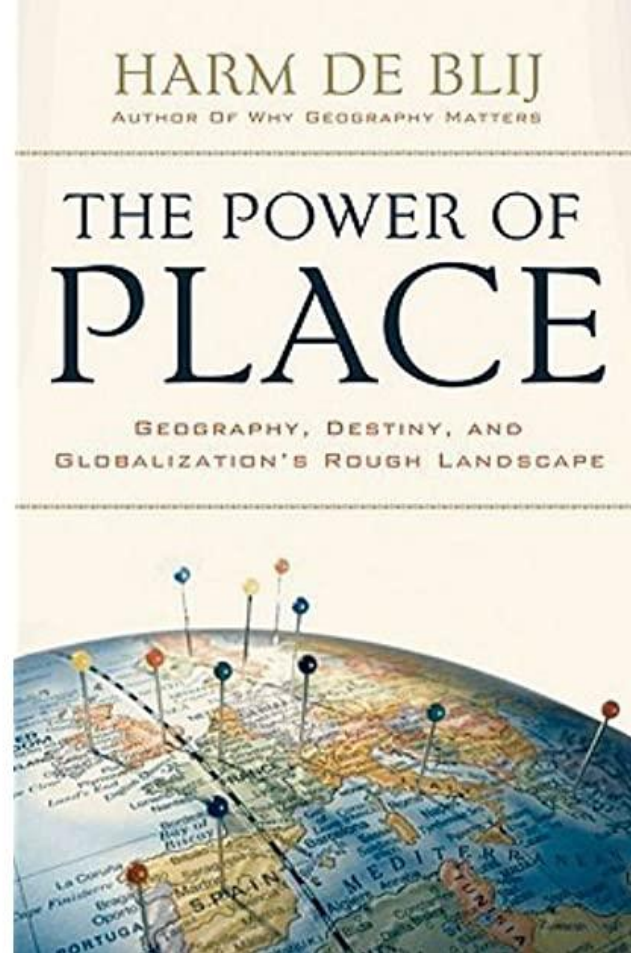
2 Workshop do Projeto Nexus/FAPESP

Índices de sustentabilidade

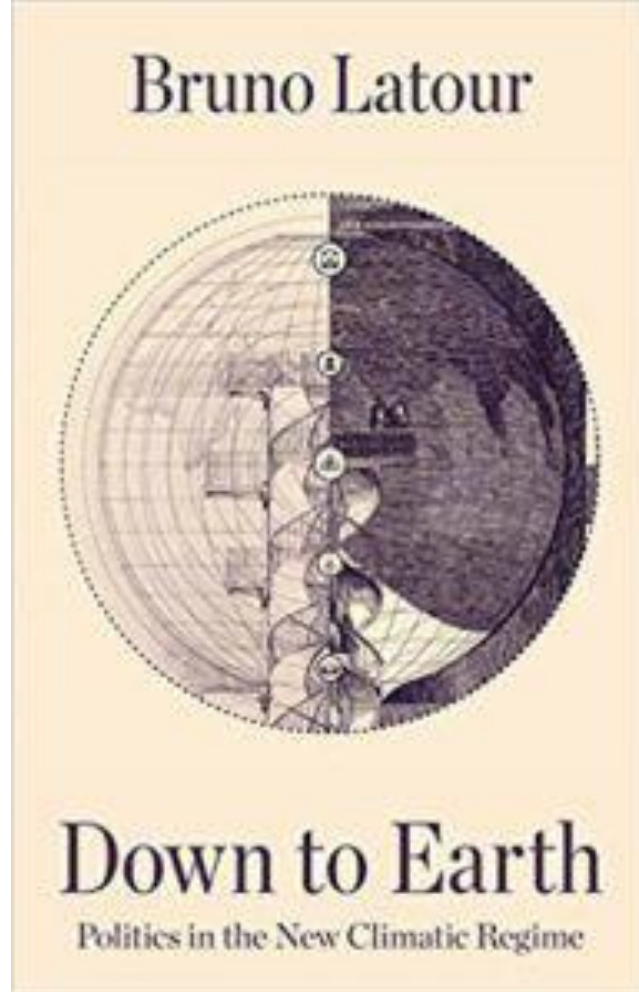
Barômetro da Sustentabilidade

Peter Toledo

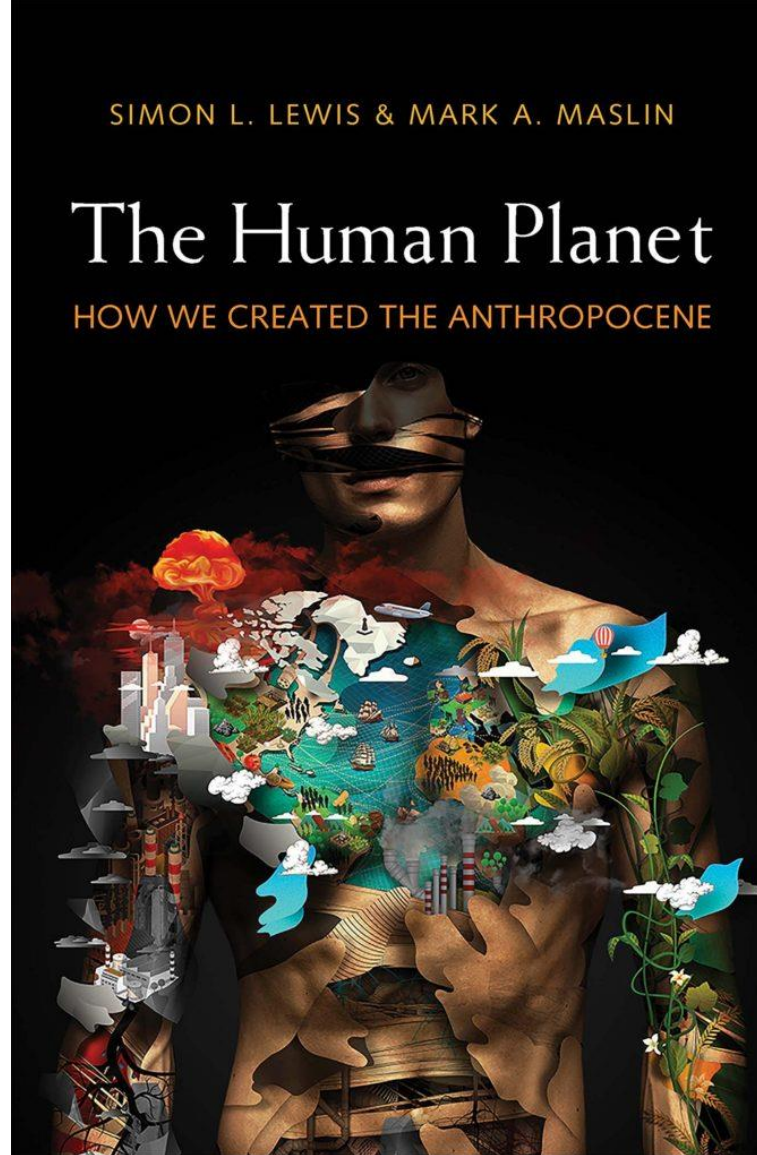
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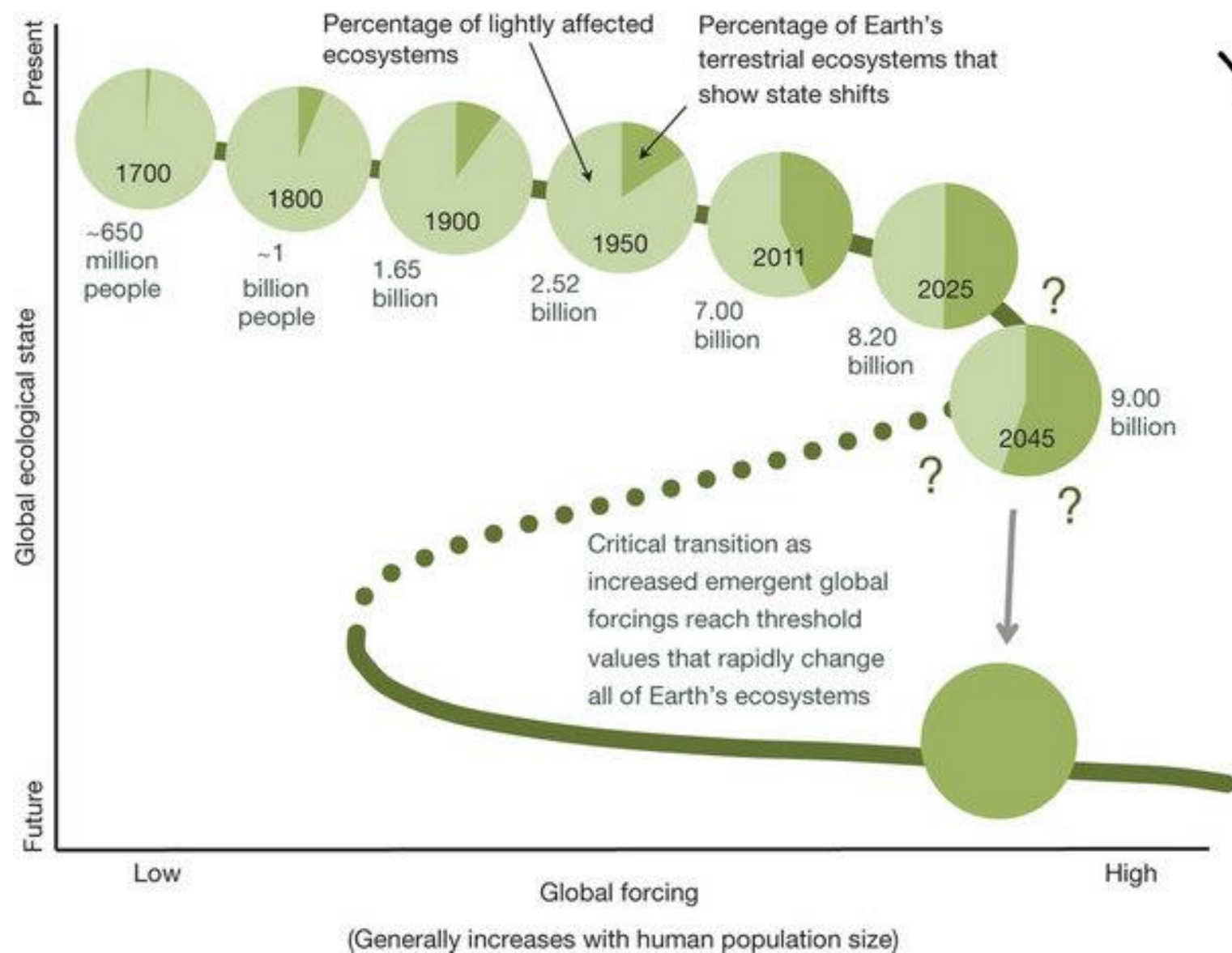
“Earth may be a planet of shrinking functional distances, but it remains a world of staggering situational differences. From the uneven distribution of natural resources to the unequal availability of opportunity, place remains a powerful arbitrator.”



“Ecological degradation on a planetary scale has become increasingly visible in recent decades. Its effects can be traced on the political landscape, contributing to the deadly cocktail of exploding inequalities, massive deregulation, and globalization, disintegrating into a looming nightmare for most of the Earth’s inhabitants.”



“The environmental changes caused by humans activity have increased to a point that today human actions constitute a new force of nature.”



A

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Scientific Consensus on

Maintaining Humanity’s Life Support Systems in the 21st Century

Information for
Policy Makers



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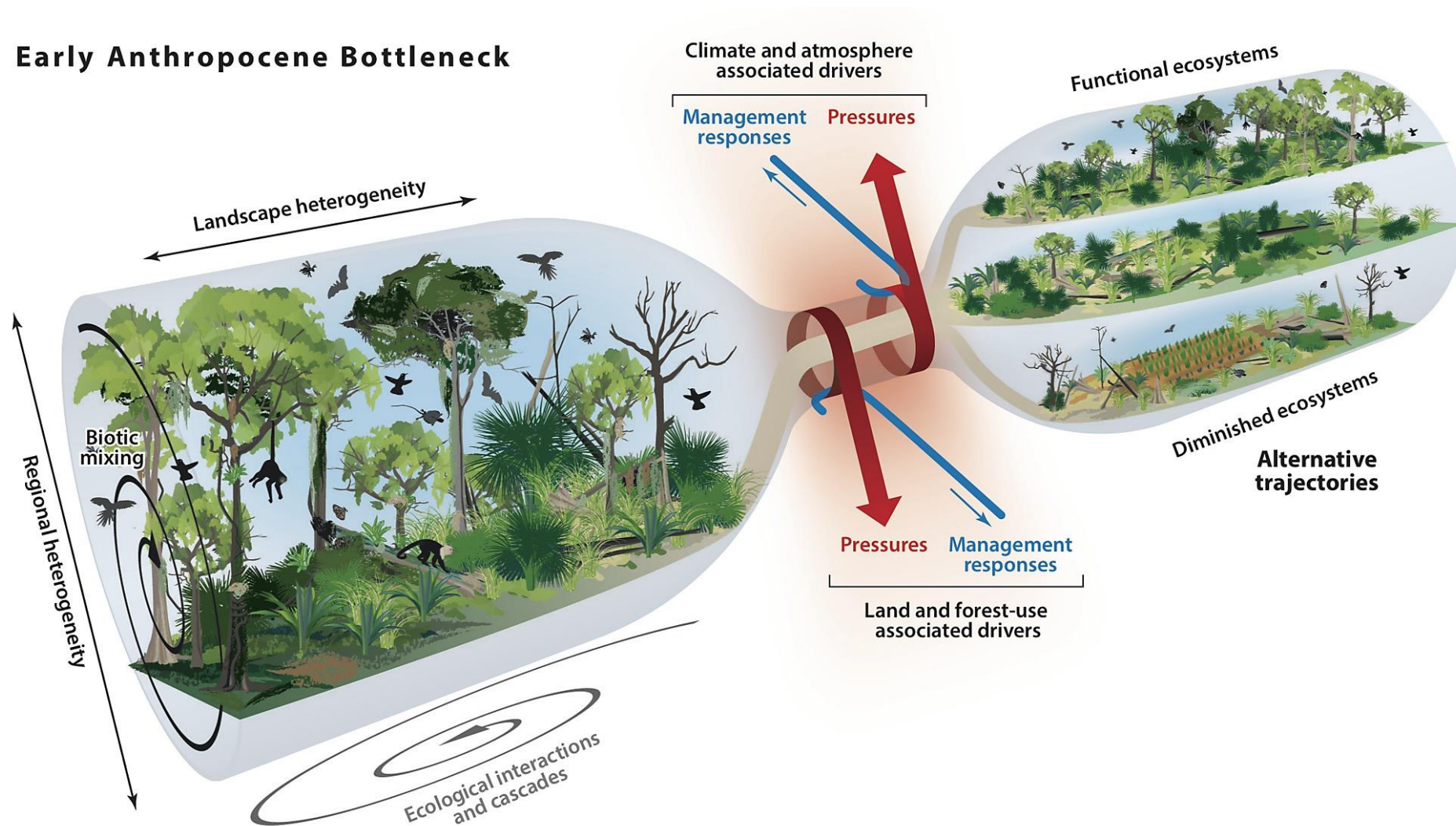
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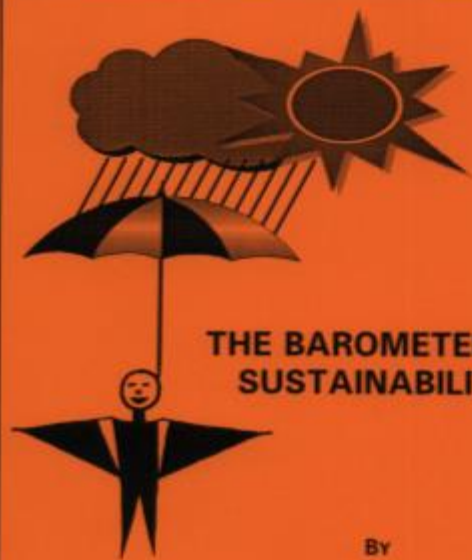
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Early Anthropocene Bottleneck





THE BAROMETER OF SUSTAINABILITY

By

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CONTRIBUTION TO THE IUCN/IDRC PROJECT ON
MONITORING AND ASSESSING PROGRESS TOWARD SUSTAINABILITY

APRIL 1995

AN APPROACH TO ASSESSING PROGRESS TOWARD SUSTAINABILITY

Tools and Training Series

Barometer of Sustainability

Measuring and communicating wellbeing and
sustainable development



Robert Prescott-Allen

May 1997

IUCN
The World Conservation Union

The barometer of sustainability is a simple method of assessing and communicating progress toward sustainability that:

- could be used at any level (local, provincial, national, international);
- combines assessments of the ecosystem and the human system into a single assessment of sustainability without trading one off against the other;
- uses a framework of indicative issues (four for the ecosystem, four for the human system), facilitating comparison among assessments and links between assessments at different levels (e.g., between local and national);
- allows users to choose the indicators (within each indicative issue) that they consider to be most appropriate for their own conditions and priorities.

The barometer of sustainability is designed to meet three needs:

- the need for a simple and vivid way of portraying progress toward sustainability;
- the need to arrive at a logical and manageable set of indicators;
- the need to give users (local and national) the flexibility to choose their own indicators while providing a framework that would enable different assessments to be compared and linked.

Ecosystem wellbeing is a condition in which ecosystems maintain their quality and diversity and thus their potential to adapt to change and provide a wide range of choices and opportunities for the future.

Human wellbeing is a condition in which all members of society are able to define and meet their needs and have a large range of choices and opportunities to fulfil their potential.

HUMAN SYSTEM CONDITION	ECOSYSTEM CONDITION				
	BAD	DECLINING	INTERMEDIATE	IMPROVING	GOOD
GOOD	UNSUSTAINABLE	POTENTIALLY UNSUSTAINABLE	POTENTIALLY SUSTAINABLE	POTENTIALLY SUSTAINABLE	SUSTAINABLE
IMPROVING	UNSUSTAINABLE	POTENTIALLY UNSUSTAINABLE	POTENTIALLY SUSTAINABLE	POTENTIALLY SUSTAINABLE	POTENTIALLY SUSTAINABLE
INTERMEDIATE	UNSUSTAINABLE	POTENTIALLY UNSUSTAINABLE	INTERMEDIATE	POTENTIALLY SUSTAINABLE	POTENTIALLY SUSTAINABLE
DECLINING	UNSUSTAINABLE	POTENTIALLY UNSUSTAINABLE	POTENTIALLY UNSUSTAINABLE	POTENTIALLY UNSUSTAINABLE	POTENTIALLY UNSUSTAINABLE
BAD	UNSUSTAINABLE	UNSUSTAINABLE	UNSUSTAINABLE	UNSUSTAINABLE	UNSUSTAINABLE

Table 1. Combining assessments of the ecosystem and human system into a single reading. Progress is toward the top right corner.

Four indicative issues of the condition of the ecosystem are:

Ecosystem naturalness/conversion. How much of the ecosystem is natural, modified, cultivated, or built. This provides a bird's-eye view of the scale and rate of human impact on the ecosystem; and a context for assessing degradation, diversity loss, and resource depletion.

Ecosystem quality/degradation. The extent and severity of degradation of air, water, and land. Degradation includes pollution.

Biodiversity maintenance/loss. Whether the diversity of ecological communities, wild species, and domesticated varieties and breeds is being maintained or is declining.

Resource conservation/depletion. Whether timber, fisheries, forage, wildlife and other resources supplied by the ecosystem are being maintained or depleted.

Four indicative issues of the condition of the human system are:

Human health. Longevity, good health, access to healthful living conditions (clean water, sanitation). A long and healthy life increases the opportunity for a person to pursue goals and develop abilities.

Access to resources. Income, employment, and access to material goods including technology. Money and other resources expand opportunities and provide means to exploit them.

Knowledge. The knowledge system includes education, training, and research. It equips individuals, organizations and society to fulfil their potential, improve understanding of the ecosystem and human system, learn from experience, and adapt to changing conditions.



Institutions. The institutional system of values, customs, laws, incentives and organizations enables society to manage people's relationships with each other and with the ecosystem.

The four ecosystem issues and the four human issues are intended to represent the main dimensions of ecosystem wellbeing and human wellbeing respectively. Therefore, it is better to assess selected aspects of all eight of them than to cover some comprehensively and neglect others. Indicators need to be chosen for each of the indicative issues. They should be few, or readily combined into a single macro-indicator or index (taking care to ensure that the indicators are of the same type and therefore combinable); and as easily monitored as possible. For each indicative issue, the society (or the assessor) defines a "good" condition to which it aspires and a "bad" condition that is unacceptable. If either condition pertains, the status of the issue is assessed as "good" or "bad". If the condition is neither "good" nor "bad", the status of the issue is assessed as "declining" or "improving" depending on the trend. If there is no clear trend, it is classified simply as "intermediate".

[HTML] Desenvolvimento sustentável no Brasil: uma análise a partir da aplicação do **barômetro da sustentabilidade**

DMP Kronemberger, J Clevelario Junior... - Sociedade & ..., 2008 - SciELO Brasil

This paper applies and discusses the application to Brazil of the Barometer of Sustainability, a two-coordinated measure of the well-being of Nations, including values for both human and ecosystem well-being and progress toward sustainable development. The main ...

☆  Citado por 42 Artigos relacionados Todas as 6 versões 

Sustentabilidade do município de João Pessoa: uma aplicação do **barômetro da sustentabilidade**

AD Lucena, JN Cavalcante, GA Cândido - Revista Brasileira de Gestão e ..., 2011 - rbgdr.net

Atualmente, os efeitos degradantes ao meio ambiente associados ao crescimento econômico e os padrões de consumo desses recursos vêm ocupando posição de destaque nas discussões de nível mundial. Surge então, o conceito de desenvolvimento sustentável ...

☆  Citado por 24 Artigos relacionados Todas as 7 versões 

[PDF] ... DE **SUSTENTABILIDADE** EM PEQUENAS BACIAS HIDROGRÁFICAS: UMA APLICAÇÃO DO "**BARÔMETRO DA SUSTENTABILIDADE**" À BACIA DO ...

DMP Kronemberger, CN Carvalho... - Geochimica ..., 2012 - ppegeo.igc.usp.br

Este trabalho discute os resultados da aplicação da metodologia do **Barômetro da Sustentabilidade** (BS) na Bacia do Jurumirim (BJ), que tem 70 km² de área, e está localizada no município de Angra dos Reis, estado do Rio de Janeiro. Ele objetivou agregar ...

☆  Citado por 18 Artigos relacionados Todas as 4 versões 

Indicadores de **sustentabilidade**: proposta de um **barômetro de sustentabilidade** estadual

TB Cetrulo, NS Molina, TF Malheiros - Revista Brasileira de ..., 2013 - rbciamb.com.br

O presente trabalho apresenta uma proposta de metodologia de **Barômetro de Sustentabilidade** para aplicação em Estados Brasileiros (BSE), garantindo robustez, utilização de bases de dados disponíveis e construção de parâmetros de **sustentabilidade** ...

☆  Citado por 11 Artigos relacionados Todas as 3 versões 

Barômetro da sustentabilidade aplicado ao município de Moju, estado do Pará

AS Cardoso, PM de Toledo, ICG Vieira - Revista Brasileira de Gestão e ..., 2016 - rbgdr.net

Esta pesquisa faz uma análise do nível de **sustentabilidade** do município de Moju, estado do Pará, considerado prioritário para implementação da política nacional dos biocombustíveis. O diagnóstico da **sustentabilidade** foi elaborado a partir da ferramenta ...

☆ 77 Citado por 12 Artigos relacionados Todas as 5 versões »»

[PDF] O Barômetro da Sustentabilidade aplicado ao município de Taubaté-SP

EL de Oliveira, EAAQ Oliveira... - Desenvolvimento em ..., 2015 - redalyc.org

A sociedade contemporânea tem apresentado uma preocupação crescente com o impacto ambiental provocado pelo desenvolvimento econômico e tecnológico. Em consequência dessa preocupação e de pesquisas que indicam a possibilidade de existirem impactos ...

☆ 77 Citado por 9 Artigos relacionados Todas as 3 versões »»

Uso do barômetro da sustentabilidade para avaliação de um município localizado em região Semiárida do Nordeste Brasileiro

A de Souza Amorim, MFF Araújo... - Desenvolvimento em ..., 2014 - revistas.unijui.edu.br

O aumento das atividades industriais e econômicas teve como consequência o aparecimento de problemas ambientais que afetam a qualidade de vida desencadeando, desse modo, uma crise de relações entre sociedade e ambiente. Nesse contexto de ...

☆ 77 Citado por 8 Artigos relacionados Todas as 6 versões »»

Barômetro da Sustentabilidade aplicado a assentamentos rurais do leste do Estado do Pará, Brasil

VCS Silva, ICG Vieira - Desenvolvimento e Meio Ambiente, 2016 - revistas.ufpr.br

A **sustentabilidade** dos projetos de assentamentos rurais na Amazônia tem sido questionada no que diz respeito aos impactos ambientais e à precariedade socioeconômica das populações assentadas. Nos últimos anos, várias metodologias de ...

☆ 77 Citado por 6 Artigos relacionados Todas as 3 versões »»



Uso do Barômetro da Sustentabilidade Para Avaliação de um Município Localizado em Região Semiárida do Nordeste Brasileiro

Aline de Souza Amorim¹

Magnólia Fernandes Florêncio Araújo²

Gesinaldo Ataíde Cândido²

Resumo:

O aumento das atividades industriais e econômicas teve como consequência o aparecimento de problemas ambientais que afetam a qualidade de vida, desencadeando, desse modo, uma crise de relações entre sociedade e ambiente. Nesse contexto de modificações culturais, sociais e ambientais, surge o conceito de desenvolvimento sustentável e, junto a ele, os indicadores de sustentabilidade que, por meio de vários índices agregados, apresentam papel central no processo de tomadas de decisão, isto é, na transformação da informação em ações concretas objetivando o interesse coletivo. Atentando para isto, este trabalho teve como objetivo avaliar a sustentabilidade do município de Caicó-RN por meio da aplicação do *Barômetro da Sustentabilidade* (BS) e, a partir dos resultados, fazer uma análise de como eles podem influenciar na qualidade da água que abastece o município. Foram feitas escalas de desempenho do município e os resultados foram tratados e colocados em escalas relativas que variam de 0 a 100. Os resultados indicam que o município estudado ocupa uma posição *potencialmente insustentável* de acordo com a metodologia da ferramenta, necessitando, deste modo, de políticas públicas que melhorem esse quadro.

Palavras-chave: Qualidade de água. Indicadores de desenvolvimento sustentável. Escalas de desempenho.

Quadro 1 – Temas, Indicadores, Valores de Referência para Elaboração das Escalas de Desempenho (EDs) dos Indicadores Ambientais de Caicó

Temas	Indicadores	Referência para elaboração das ED e fontes consultadas
Atmosfera	Número de veículos <i>per capita</i> (por 1000 habitantes)	Este indicador foi escolhido por serem as emissões veiculares a principal fonte de poluição atmosférica nos grandes centros urbanos brasileiros. Considerou-se que, em termos de qualidade do ar, um menor número de veículos por 1.000 habitantes é ambientalmente melhor.
	Terras em uso agroflorestal (%)	O limite de até 20% de uso para a classe sustentável baseou-se nas leis que regulam o uso da terra na Amazônia Legal, onde somente 20% da área das propriedades rurais pode ser desmatada.
Terra	Área total antropizada (%)	Utilizou-se a mesma escala das terras em uso agroflorestal, com acréscimo de mais 5% a cada classe por conta de áreas urbanas com infraestrutura e outros tipos de uso antrópico.
	Áreas protegidas (%)	Considerou-se que para a preservação da biodiversidade de um bioma ou ecossistema, o ideal é que pelo menos 30% (em torno de 1/3) de sua área total esteja preservada de uma maior interferência humana. Assumiu-se que com menos de 10% de áreas protegidas as perdas de biodiversidade são significativas.
Saneamento	Lixo coletado (rural) (%) – peso 0,1*	A escala de desempenho foi elaborada considerando que, do lixo produzido nas áreas rurais, 20% precisa ser coletado e adequadamente disposto. Para a obtenção das outras classes foi aplicado um intervalo decrescente de 5%.
	Lixo coletado (urbano) (%) – peso 0,9*	Nas áreas urbanas considerou-se que apenas 5% do lixo produzido pode ser “absorvido” no próprio domicílio sem implicações à saúde e ao bem-estar dos moradores. O mínimo tolerável para a coleta urbana de lixo é de 70%.
	Destinação final adequada do lixo coletado (%)	Por implicações sanitárias, poluição do solo e dos corpos hídricos, assumiu-se como sustentável somente quando a cobertura de serviço atinja 100%. Considerou-se que o mínimo tolerável seria 70%. Abaixo deste patamar a situação é insustentável.
	Volume de esgoto coletado	
	Tratamento do esgoto coletado (%)	

Quadro 2 – Temas, Indicadores, Valores de Referência para Elaboração das EDs dos Indicadores Sociais de Caicó

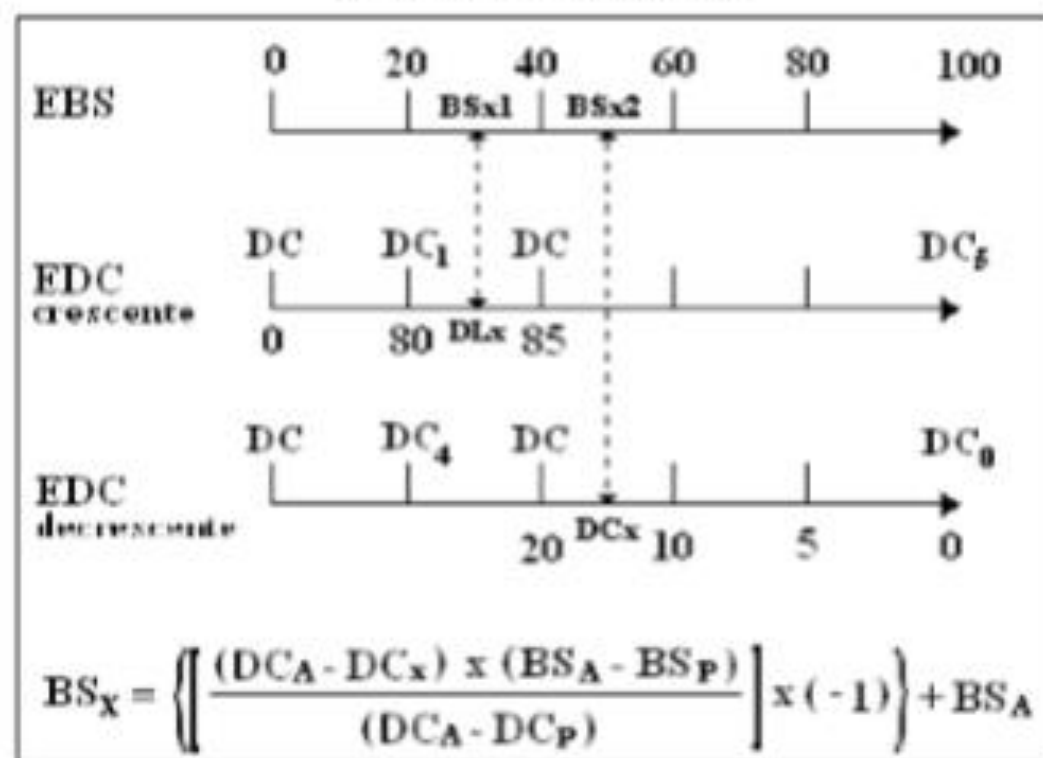
Temas	Indicadores	Referência para elaboração das ED e fontes consultadas
População	Taxa de crescimento populacional (%)	Definida a partir de taxas de crescimento populacional de países do mundo.
	Taxa de desocupação (%)	Definida a partir das taxas de desocupação de países do mundo.
Trabalho e rendimento	Índice de Gini (adimensional)	Variável própria do índice (0=perfeita igualdade e 1=desigualdade máxima); 0,5 é considerado um valor que representa forte desigualdade na distribuição de renda.
	Rendimento médio mensal (R\$)	Utilizou-se como referência o valor do salário mínimo necessário para uma família de 4 pessoas (2 adultos e 2 crianças), calculado pelo DIEESE para o ano de 2002, correspondente a R\$1.091,00.
	Razão de rendimento por sexo (mulher/homem) (adimensional)	A situação ideal é razão igual a 1, que representa igualdade de oportunidade econômica; quanto mais distante de 1, maior a desigualdade.
	Razão de rendimento por raça (negros+pardos/brancos)	
	Esperança de vida ao nascer (anos)	Baseado em PNUD (2002).
Saúde	Taxa de mortalidade infantil (%)	As taxas de mortalidade infantil são classificadas pela OMS em baixas (abaixo de 20 por mil), médias (20 a 49 por mil) e altas (50 por mil ou mais).
	Número de leitos hospitalares (por 1000 hab.)	Foi considerado sustentável um número de leitos maior que 3 para cada 1.000 habitantes. De acordo com a Portaria n. 1.101/GM, de 2002, do Ministério da Saúde, que dispõe sobre o estabelecimento de parâmetros de cobertura assistencial, a necessidade de leitos hospitalares totais é de 2,5 a 3 para cada 1.000 habitantes (IDS, 2008).
	Imunização contra doenças infecciosas infantis (%)	A condição ideal é que a cobertura de vacinação das crianças seja de 98% ou mais, garantindo o controle das doenças infecciosas infantis.

Quadro 5 – Escalas de Desempenho dos IDS e fonte e ano do censo do
 dado obtido – Dimensão Ambiental – Caicó/RN e sua Associação com a EBS

IDS	Valores dos IDS para Caicó-RN	Escala do Barômetro da Sustentabilidade				
		0-20	21-40	41-60	61-80	81-100
		Insustentável	Potencialmente insustentável	Intermediário	Potencialmente sustentável	Sustentável
Número de veículos per capita (por 1.000 hab.)	245 ¹	800-651	650-601	600-401	400-201	≤200
Terras em uso agro-silvo-pastoril (%)	67,28 ²	>60	60-41	40-31	30-21	≤20
Área total antropizada (%)	77 ³	>65	65-46	45-36	35-26	≤25
Áreas protegidas (%)	5,04 ⁴	0-10	11-15	16-25	26-30	>30
Lixo coletado (rural) (%) – peso 0,1*	40,3 ⁵	0-5	6-10	11-15	16-20	>20
Lixo coletado (urbano) (%) – peso 0,9*	98,3 ⁶	0-70	71-80	81-90	91-95	>95
Destinação final adequada do lixo coletado (%)	0 ⁷ (destino final céu aberto)	0-70	71-85	86-95	96-99	100
Volume do esgoto coletado (%)	20,2 ⁸					
Tratamento de esgoto coletado (%)	5 ⁹	0-70	71-80	81-90	91-95	>95

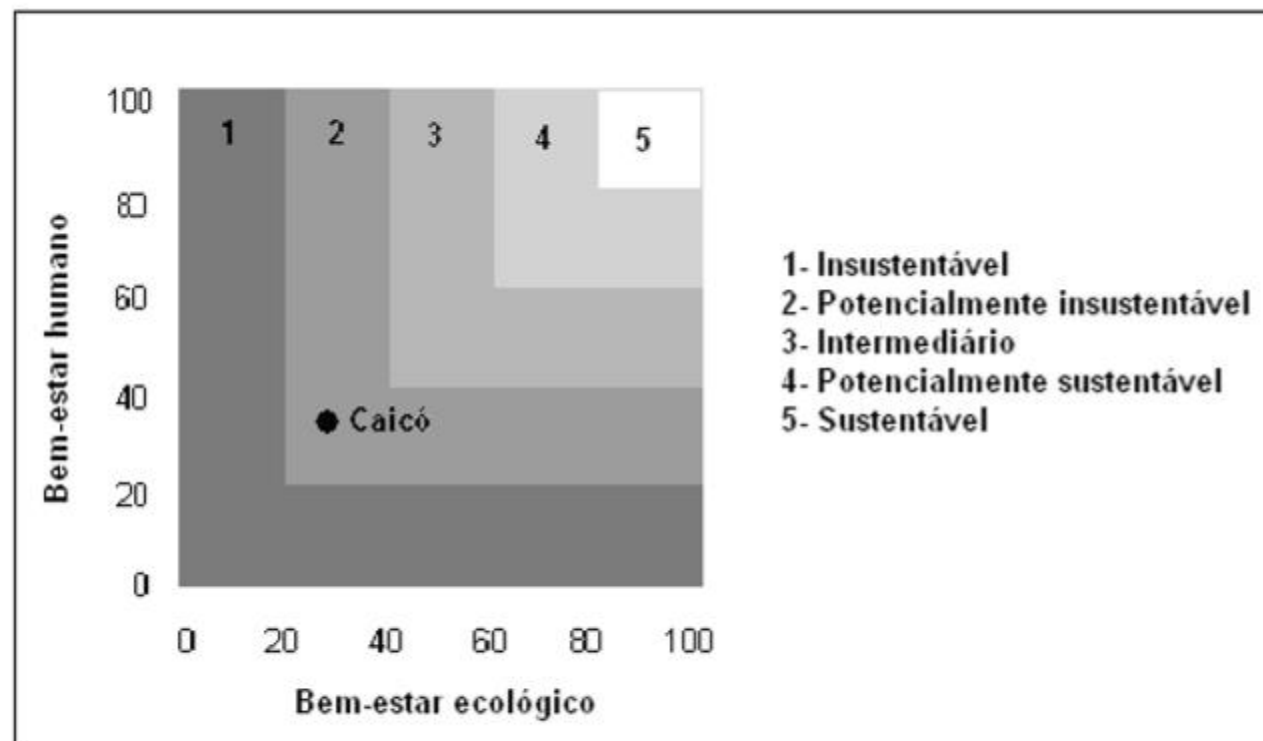
Fonte: 1. Instituto, 2000; 2. Instituto, 2006; 3. Instituto, 1995; 4. Sistema, 2005; 9. Instituto, 2008.

Figura 1 – Fórmula para calcular o grau de Desempenho do Indicador para Caicó



Fonte: Adaptado de Kronemberger *et al.* (2008). DC_x : Desempenho do Indicador para Caicó; EBS: Escala do Barômetro da Sustentabilidade); EDC: Escala de Desempenho para Caicó.

Figura 2 – Posição de Caicó no BS



Fonte: Adaptada de Prescott-Allen (2001) (apud Kronemberger et al., 2008).

Áreas Prioritárias para Conservação da Biodiversidade no Cerrado e Pantanal

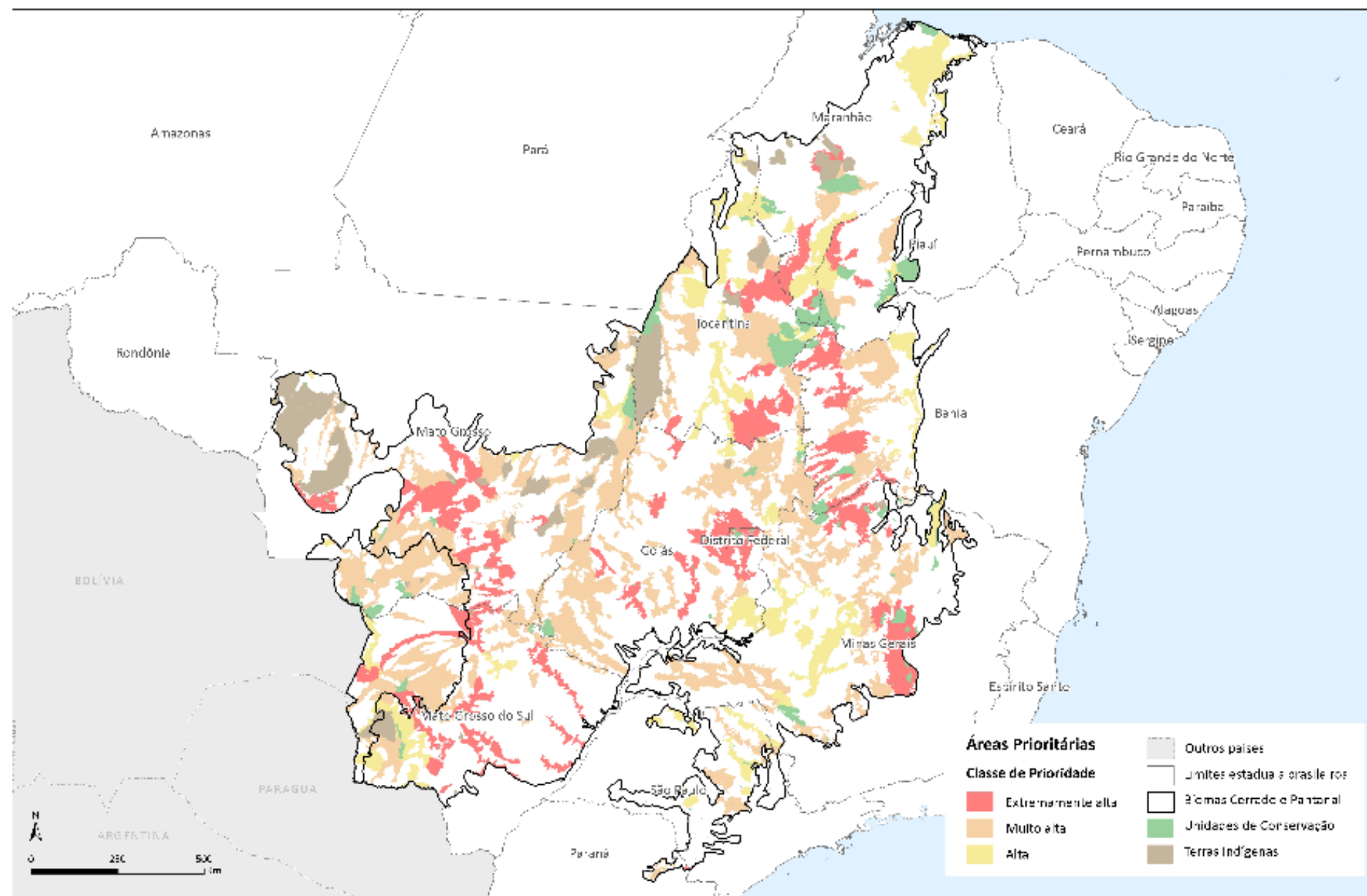


Figura 1
*Áreas prioritárias
para a conservação
da biodiversidade
da Caatinga.*

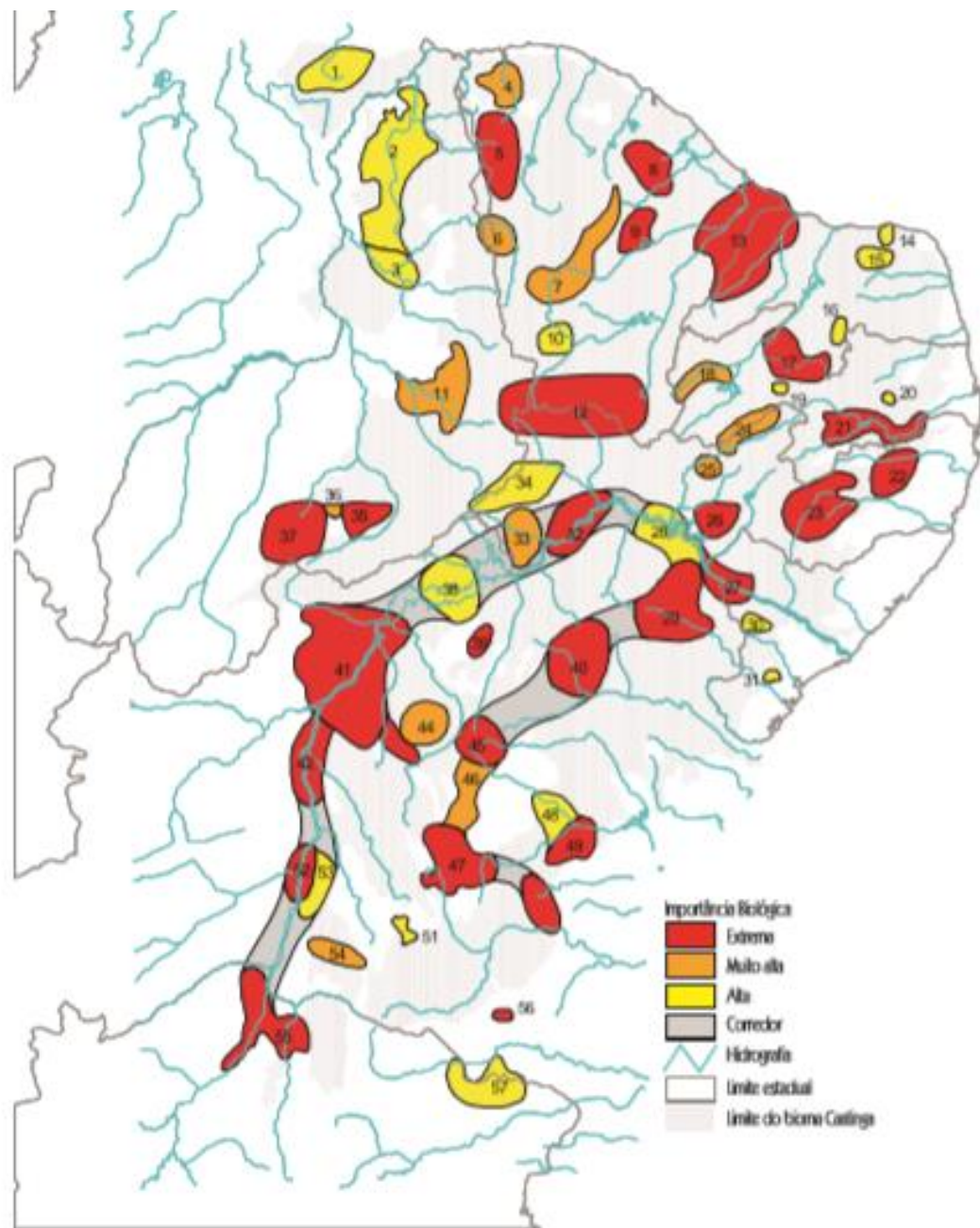


TABLE 1-4. Definitions of indicator species.

Definitions of indicator species that emphasize biodiversity

A small set of species with occurrence patterns that functionally are related to species richness of a larger set of organisms (Thomson et al. 2005, 504).

Definitions of indicator species that emphasize environmental health

In biology an indicator is an organism so intimately associated with particular environmental conditions that its presence indicates the existence of those conditions (Patton 1987, 33).

A characteristic of the environment that, when measured, quantifies the magnitude of stress, habitat characteristics, degree of exposure to the stressor, or degree of ecological response to the exposure (Hunsaker & Carpenter 1990, xxiii).

Ecological indicators have several purposes. They can be used to assess the condition of the environment or to monitor trends in condition over time. They can provide an early warning signal of changes in the environment, and they can be used to diagnose the cause of an environmental problem (Dale & Beyeler 2001, 4).

Definitions of indicator species that emphasize responses to specific taxa

A species or group of species that responds predictably, in ways that are readily observed and quantified, to environmental disturbance or to a change in environmental state (McGeoch 2007, 145).

Definitions of indicator species that combine environmental health and responses of specific taxa

An indicator may be defined as a characteristic that, when measured repeatedly, demonstrates ecological trends, and a measure of the current state or quality of an area (Ferris & Humphrey 1999, 313–14).

Definitions of indicator species that combine environmental health and species representing responses of other species in the community

Managers use indicators for two different reasons—first because their presence and fluctuations are believed (or hoped) to reflect those of other species in the community; and second because they are believed to reflect chemical and/or physical changes in the environment (Simberloff 1998, 248).

Definitions of indicator species that combine environmental health, responses of specific taxa, and species representing responses of other species in the community

An indicator is a statistic or parameter that, tracked over time, provides information on trends in the condition of a phenomenon and has significance extending beyond that associated with the properties of the statistic itself. Environmental indicators are selected key statistics that represent or summarize a significant aspect of the state of the environment, natural resource sustainability, and related human activities. They focus on trends in environmental changes, stresses

TABLE 1-4. Definitions of indicator species.

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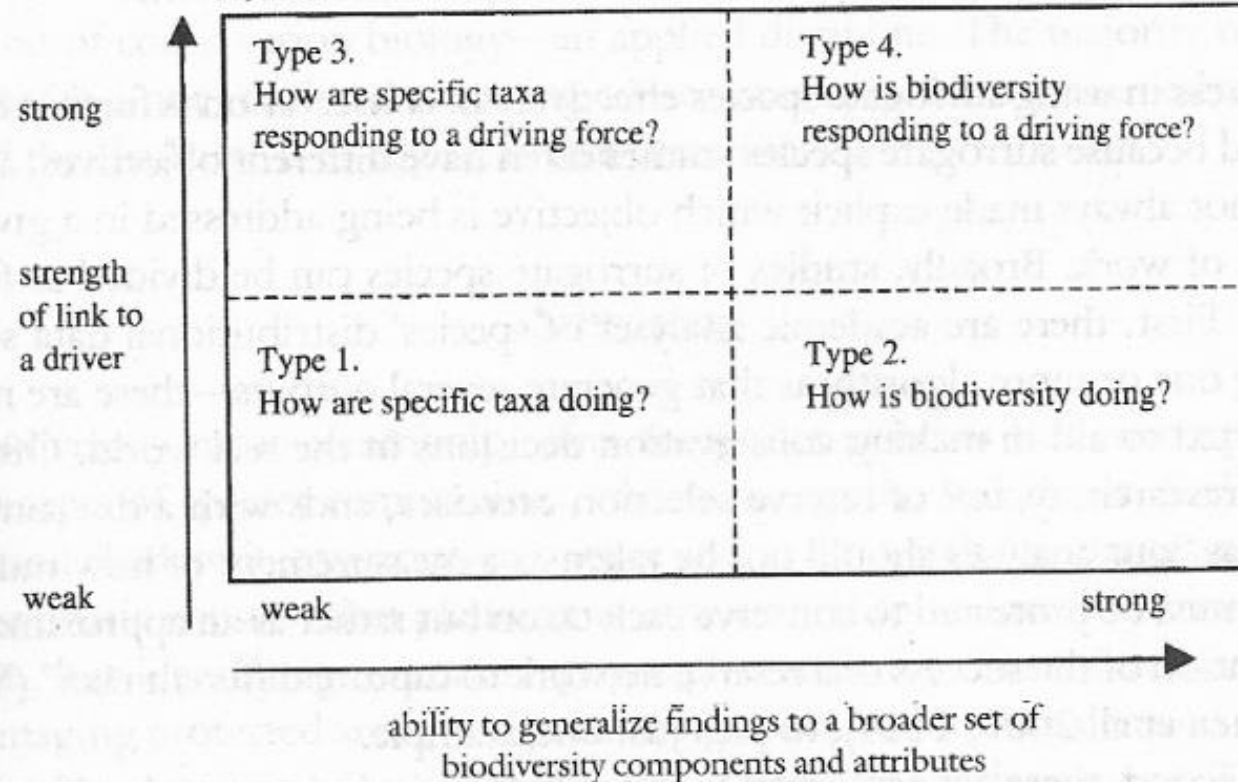


FIGURE I-7. A classification of indicators for biodiversity based on our ability to generalize findings to a broader set of biodiversity components and attributes, and potential links to natural or man-induced drivers. (Reprinted from Gregory et al. 2005.)

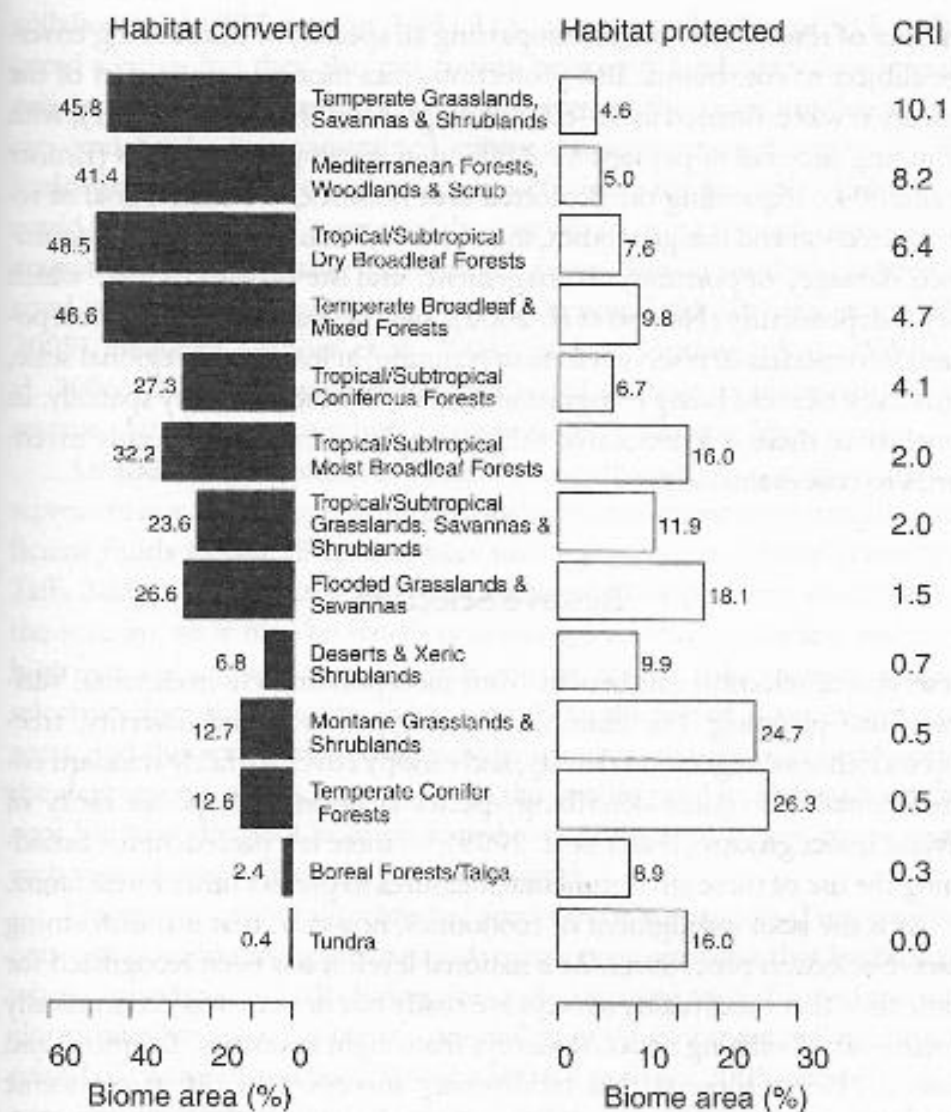
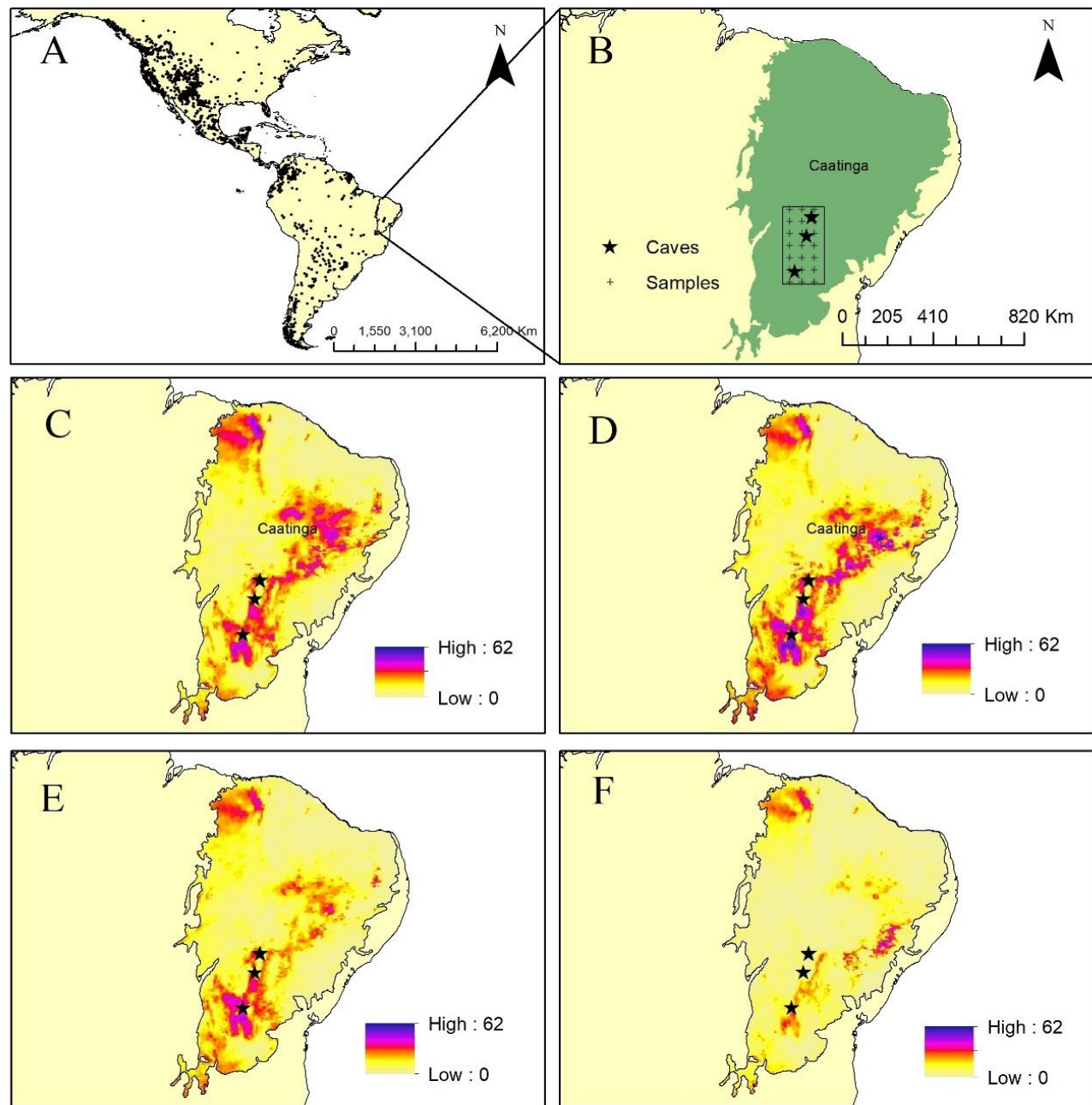


FIGURE 10-1. Habitat conversion and protection in the world's 13 terrestrial biomes. Biomes are ordered by their Conversion Risk Index. (CRI is the ratio of the percent area converted to the percent area protected—an index of relative risk of biome-wide biodiversity loss.) (Reprinted from Hoekstra et al. 2005.)

TABLE 8-4. Common causal chains in uncovering a conservation problem. Early warning species are shown at the bottom.

<i>First event</i>	<i>Second event</i>	<i>Measures</i>	<i>Example</i>
Species found to be declining.	Populations of other species found to be declining.	Steps taken to stop all declines.	Asian vultures
Species found to be declining.	Environmental change acknowledged.	Steps taken to identify specific aspects of change.	Amphibians
Environmental change recognized.	Populations found to be declining.	Specific aspects of change specified and restoration initiated.	European farm birds
Environmental change recognized.	Species identified as likely to be at risk.	Legal steps taken to protect them.	Polar bear
Environmental change anticipated.	Species found to be declining.	Steps taken to stop decline of that and other species.	



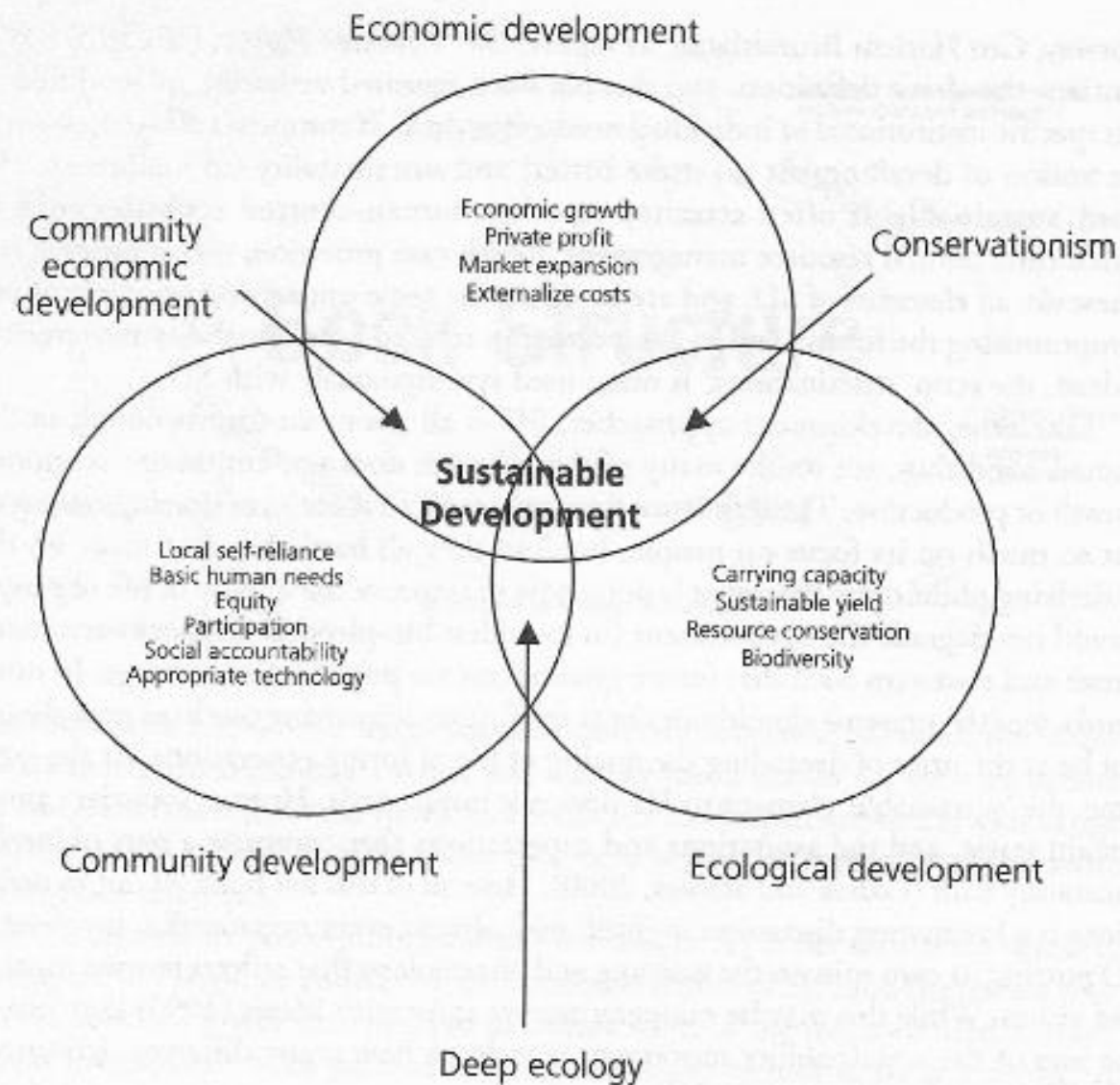
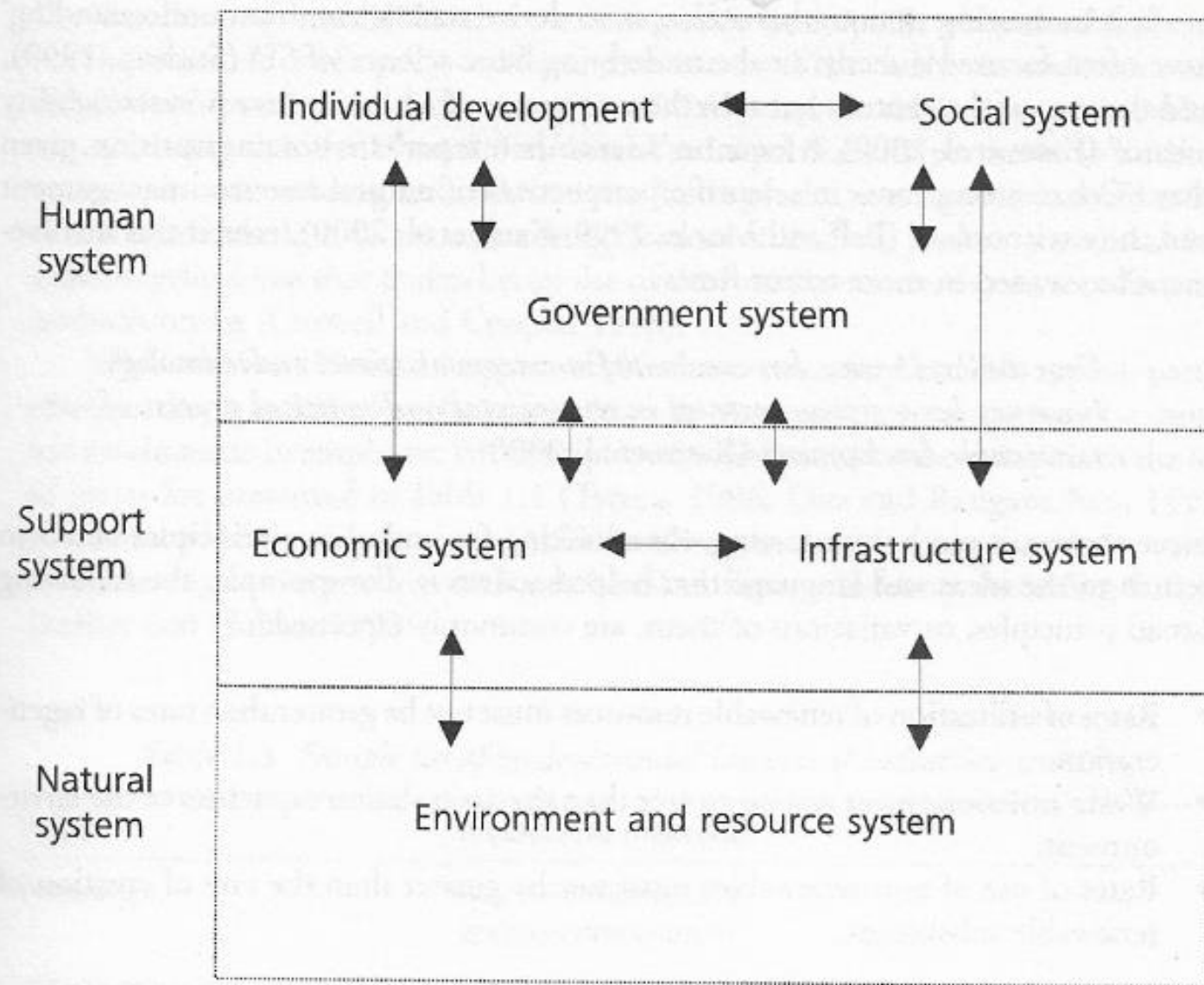


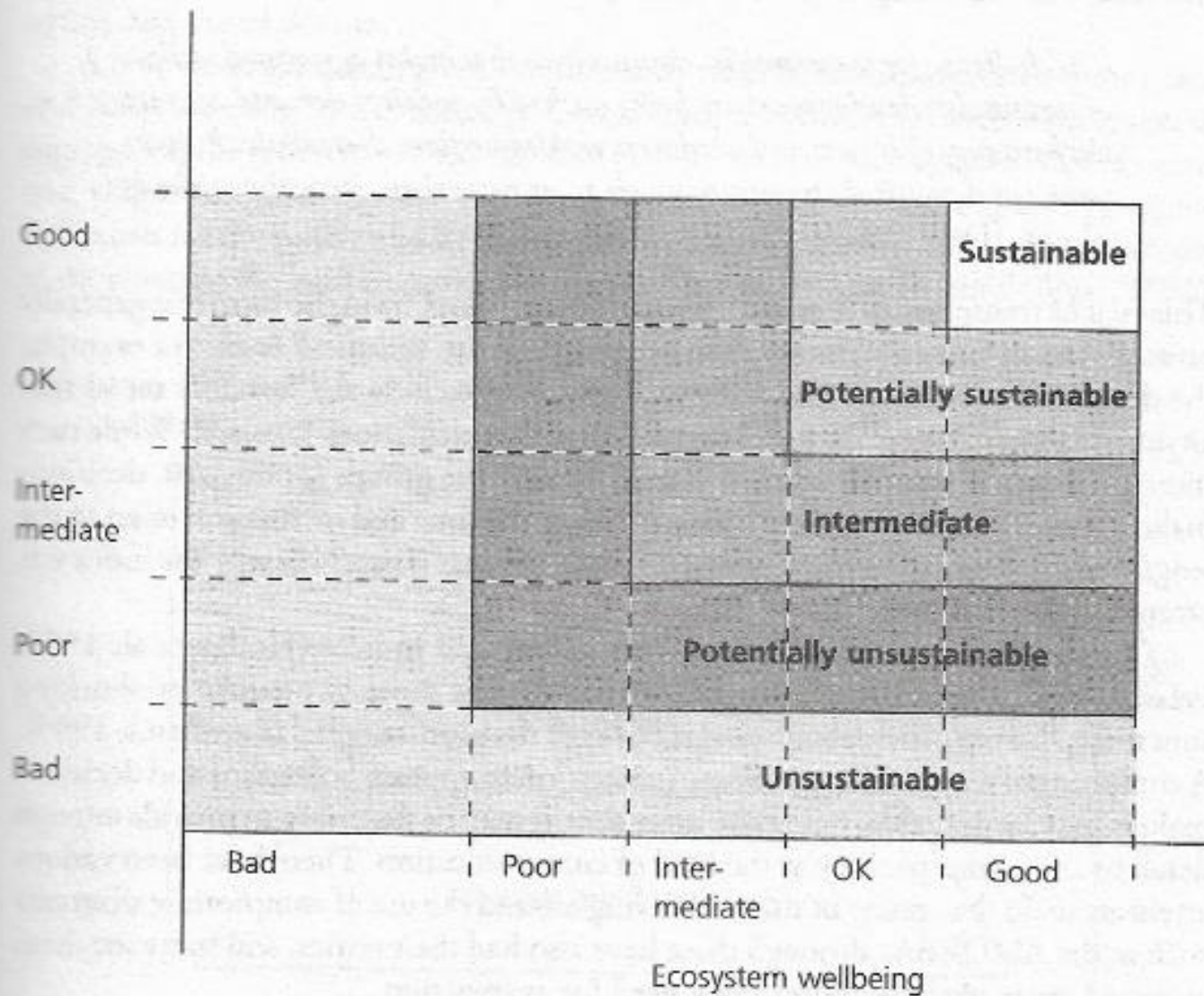
Figure 1.1 *The interactions between ecological, economic and social (community) development*



Source: after Bossel, 1999

Figure 1.2 *The six key sub-systems of human society and development*

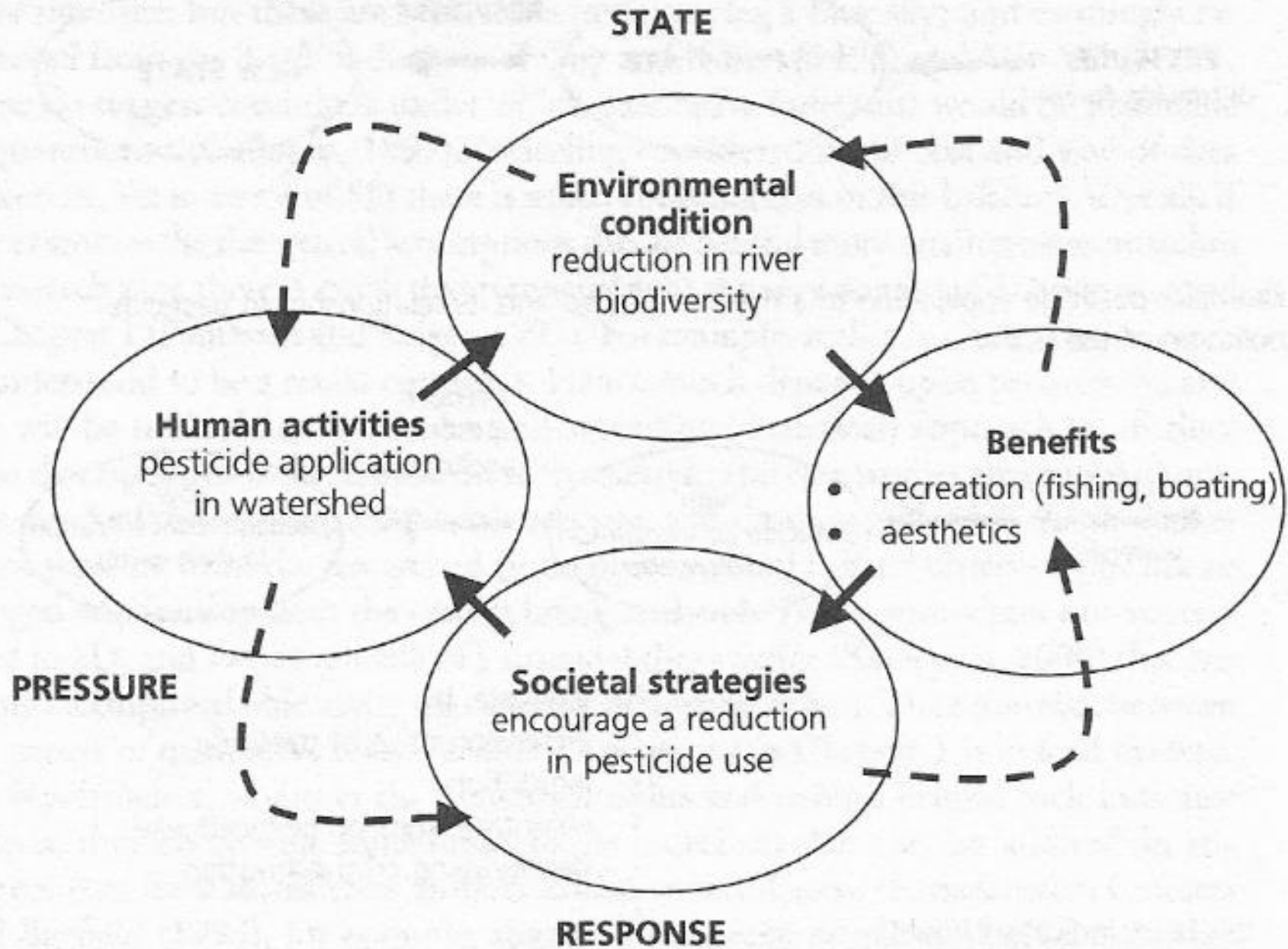
Human wellbeing



Source: adapted from Prescott-Allen, 1997

Figure 2.5 *The IUCN barometer of sustainability*

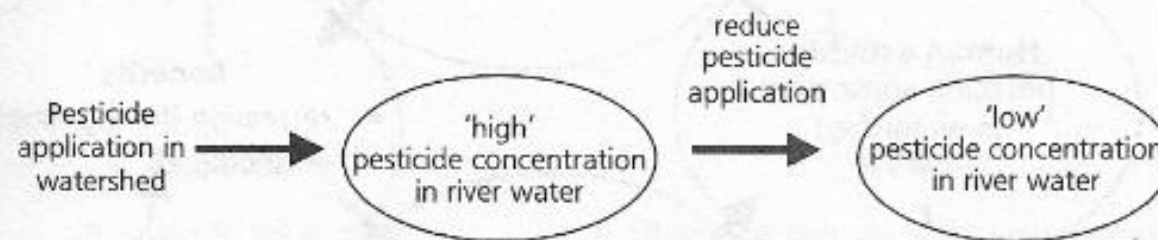
Example: pesticide pollution of a river



(a) Linear PSR model



Example: pesticide application to a river watershed and its relationship to pesticide pollution of the river



For example, by:

- increasing price of pesticide
- legislation
- voluntary limits on pesticide use
- discouraging crop cultivation

In this case, indicators could measure:

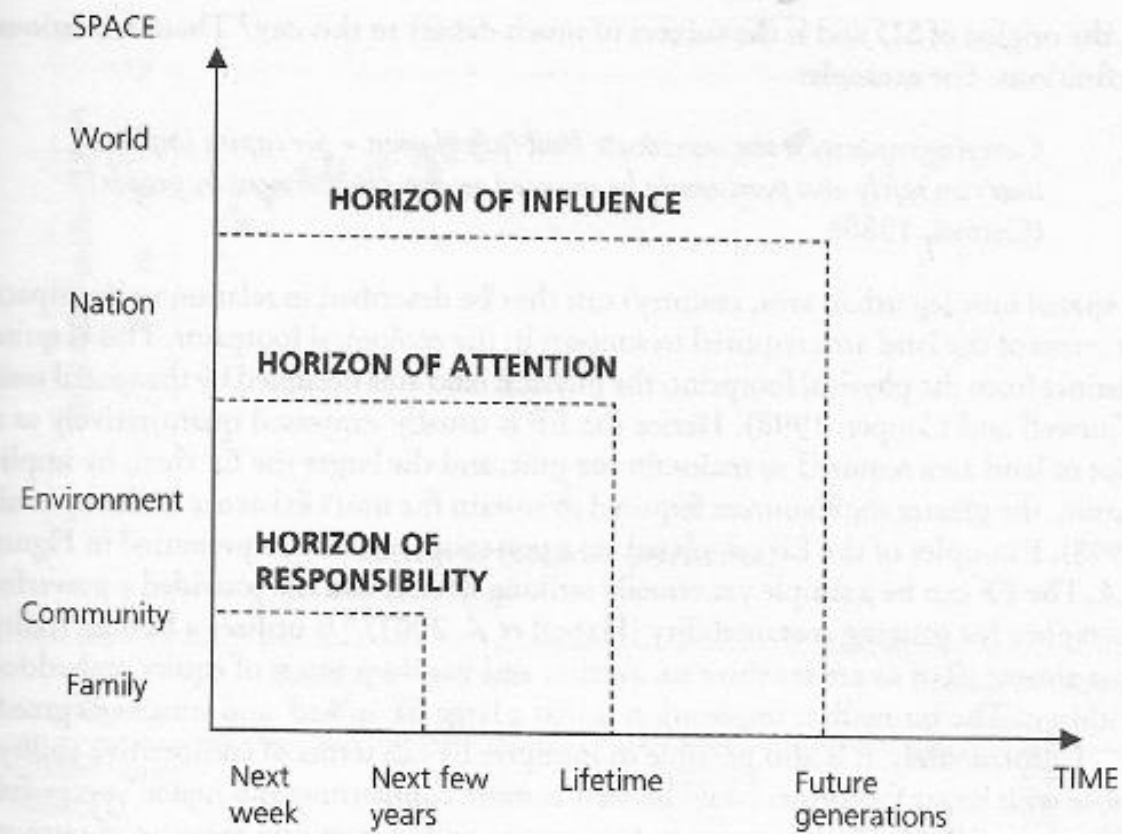
- application rate of pesticide (active ingredient applied per area of watershed)
- concentration of pesticide in river water
- price of pesticide, taxes
- number of laws/measures to limit pesticide use
- number (eg meetings, media messages) and success rate (eg attendance at meetings, surveys of awareness) of campaigns designed to heighten farmer awareness of the issue and discourage pesticide use

Not unsurprisingly, public participation has become a cornerstone of community development projects in many countries, and the US is particularly rich in examples (Besleme and Mullin, 1997). Guy and Kibert (1998), for example, referring to the Florida Local Assessment Guide (FLAG) in the US, suggest that such community participation can help in SD programmes because:

- it can help ensure that local government focuses on areas of concern where money will be wisely spent;
- it can result in a reduced risk of public opposition when hard choices are made based on limited resources;
- it is cheaper than employing professionals!
- citizens feel a sense of worth that makes them more willing to make contributions;
- it personalizes the process, resulting in greater feelings of public ownership and greater degrees of care than more objective outside 'experts'; and
- it builds community empowerment and self-accountability, especially relevant at a time of 'downsizing government'.

While indicators are a logical device to use in SD, especially given their long record of use in fields such as economics, social accountability and environmental science (Bell and Morse, 1999), there are a number of key questions related to their development and application. These include:

- What indicators should one select?
- Who selects them?
- Why are they selected?
- What are they meant to help achieve?
- What about the balance between the various dimensions of SD?
- How are the indicators to be measured?
- How are the indicators to be interpreted, and by whom?
- How are the results to be communicated, to whom and for what purpose?
- How are the indicators to be used?



<i>Horizon of</i>	<i>Comprising</i>
Influence	Systems in time and space that are significantly affected by an actor's influence
Attention	Systems whose behaviour, development and/or fate is of some interest to an actor
Responsibility	Systems where an actor would be willing to carry some responsibility in order to see them survive or improve

Note: For sustainable development the horizon of attention must not be smaller than the horizon of responsibility

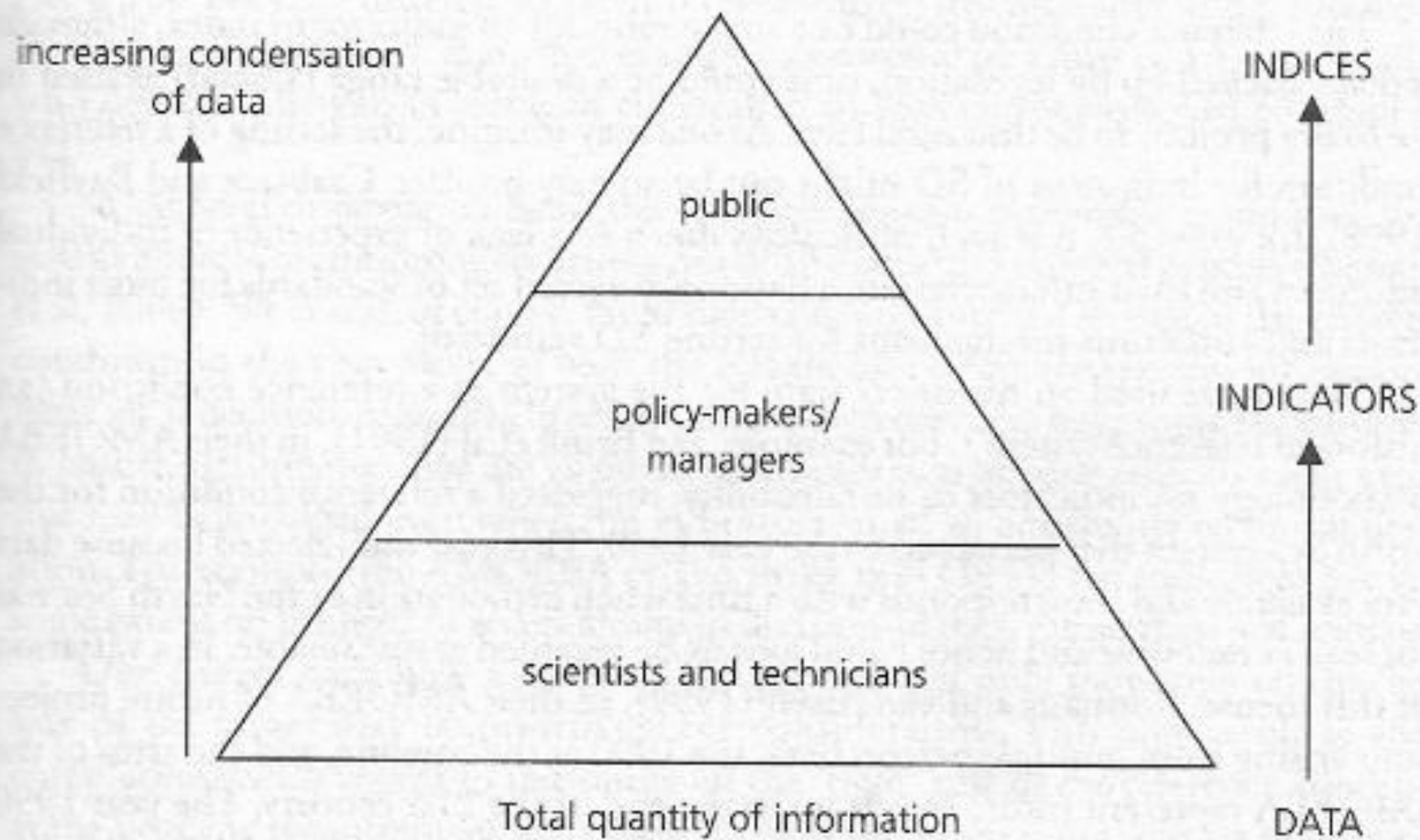
Source: after Bossel, 1999

Numerous writers and practitioners have discussed the desirability of integrating a suite of indicators into a single index for SD.⁶ Experts are divided into those who see this is a good thing, and those who stress the dangers. The following quotation sets out the basic difficulty:

[I]t would be counterproductive if new indicators were to become weighted and averaged together – leading to more fetishising of one single index, which tries to add up all the apples and oranges into a single number coefficient. This can turn out to lead to the same kind of nonsense as the GNP indicators. It is better on scientific grounds, as well as those of public education and efficient, democratic government to have a group of indicators covering different dimensions. [O]nly transparent and tangible indicators that people can readily understand and visualize and relate to their own lives will provide the desired political constituency for needed governmental policy. This has been an endemic problem with economics, and its arcane formulae which have left people mystified, alienated and demotivated. (Henderson, 1991, p176)

The lack of transparency afforded by highly aggregated indicators is a serious problem (Moffatt, 1994; Allenby et al, 1998; Jesinghaus, 2000). Yet:

The challenge for the scientific community is that highly aggregated indices of sustainable development are being pushed by political demand, despite the hesitancy of experts and scholars to tackle questions that involve human values and political processes as much as, or more than, scientific methodologies. (Dahl, 1997)



Source: Braat, 1991

Figure 2.6 *Relationships between indicators, data and information: the OECD 'pyramid of indicator sets'*