Thème 2-1 Les liens entre l'économie et l'environnement, une perspective macro

- Courbe de Kuznets
- Notions de développement durable
- Indicateurs de développement durable

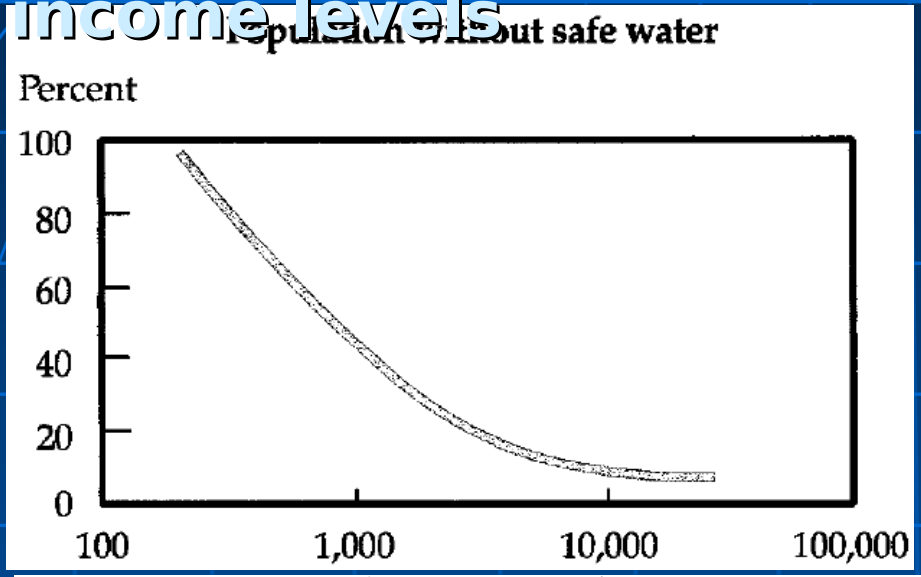
GLOBALEMENT, que se passe-t-il?

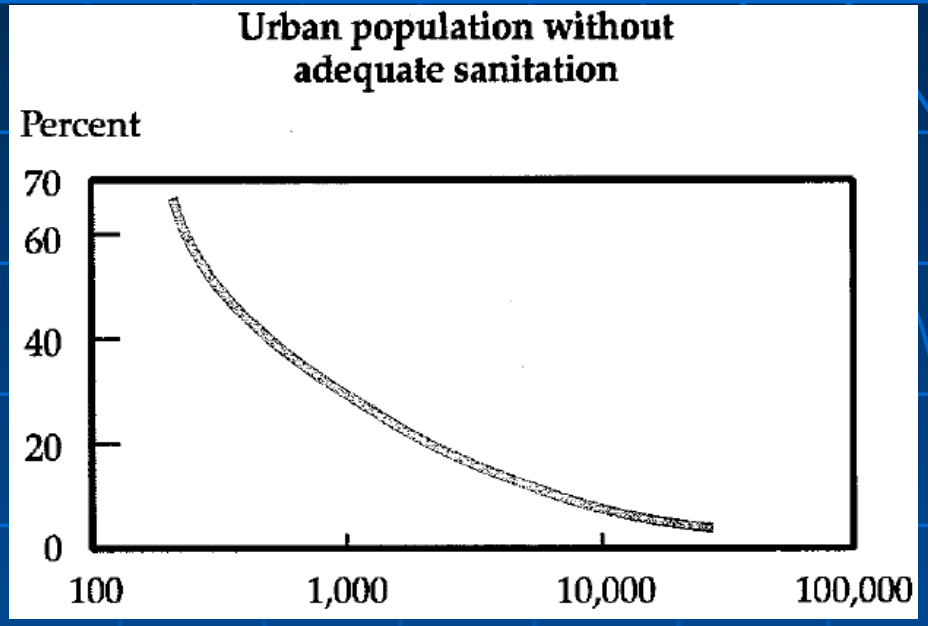
- « 1575 scientifiques avertissent que le désastre guette la planète. »
- « La qualité de l'environnement s'est constamment détériorée au cours des 25 dernières années. »
- « La pollution diminue dans plusieurs régions du pays. »

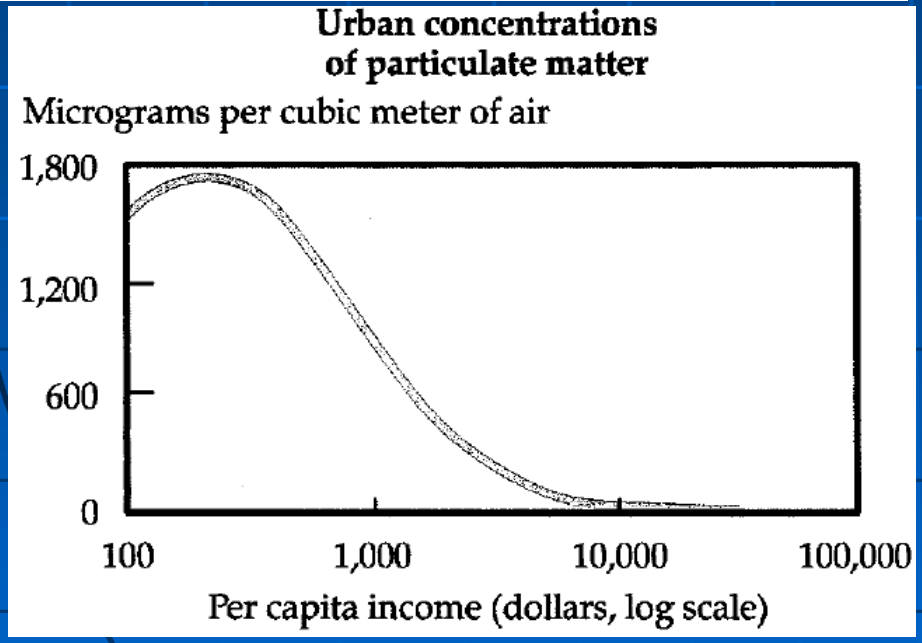
La courbe de Kuznets

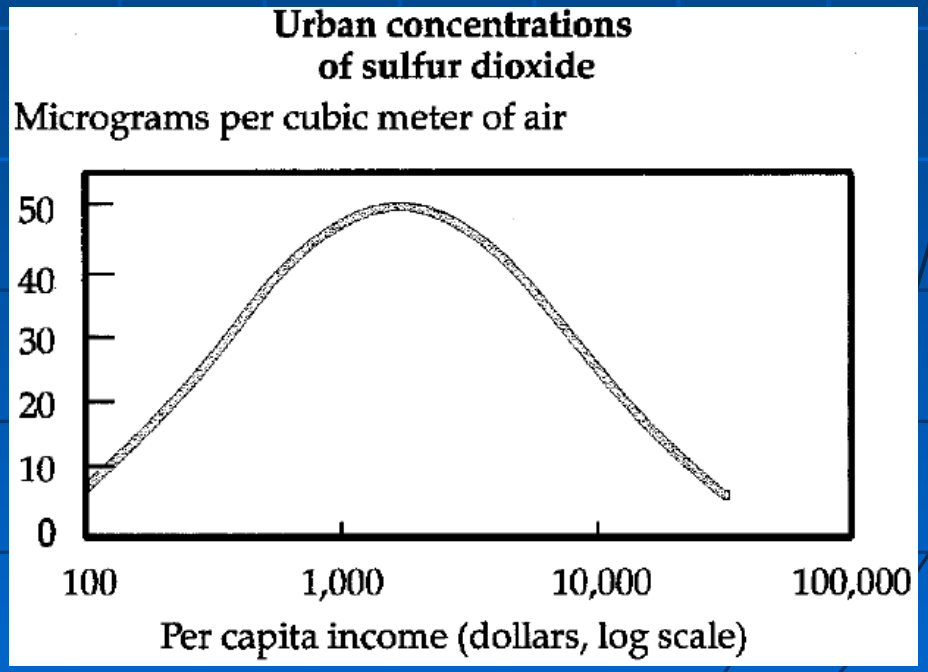
- Pollution en fonction de la richesse (PIB par habitant)
- À partir d'un seuil, + on est riche, + on se préoccupe de l'environnement
- Pertinent pour la majorité des polluants sauf le CO_2 et les déchets domestiques

Environmental indicators at different country income levels



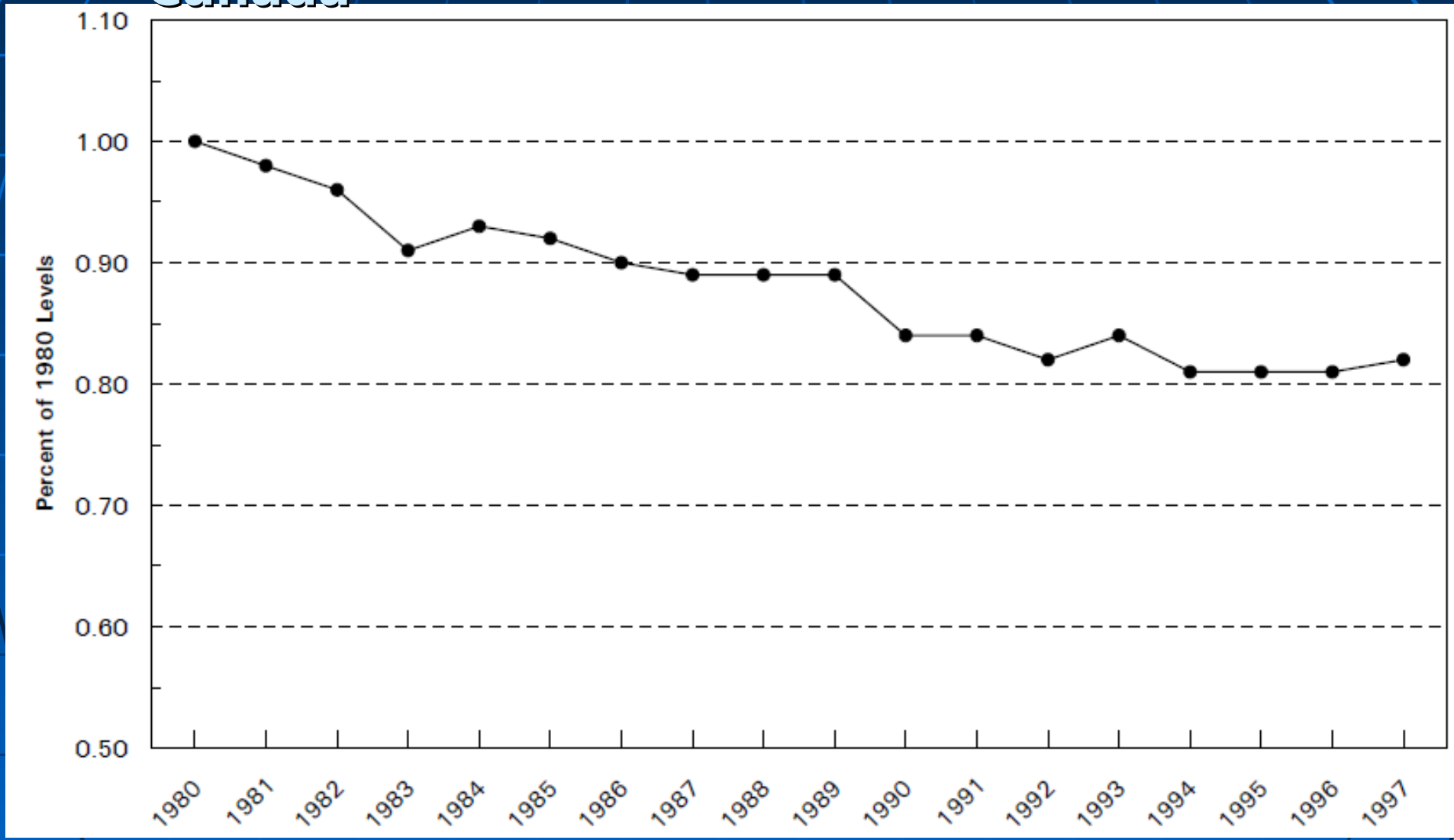






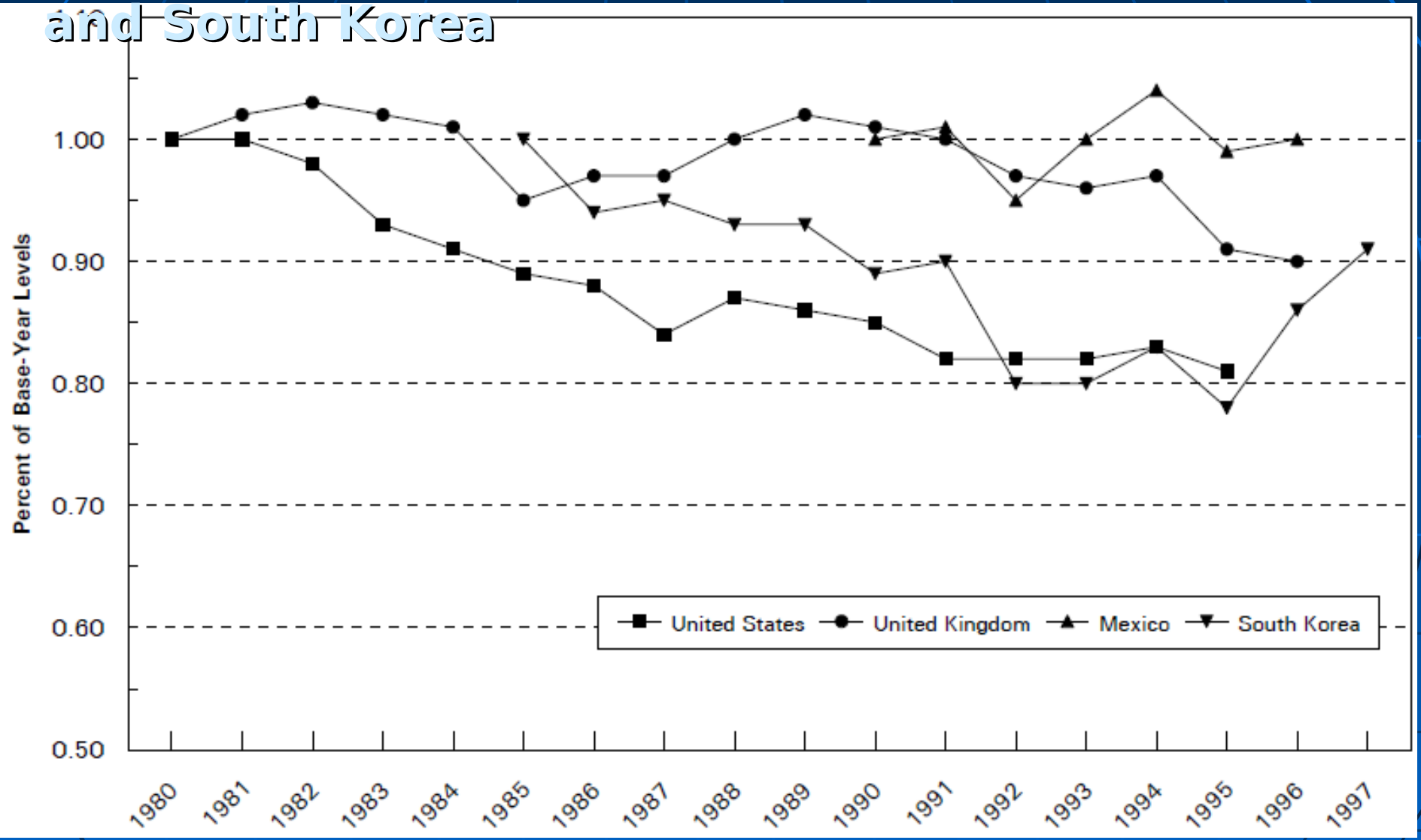
World Bank (1992)

Severity of Environmental Problems in Canada



Fraser Institute (2000)

Relative Severity of Environmental Problems in the United States, the United Kingdom, Mexico, and South Korea



Fraser Institute (2000)

Table 7.1 **Selected economic trends and environmental pressures**[a], 1990-2004
(% changes)

	1990-2004	1995-2004
SELECTED ECONOMIC TRENDS		
GDP[b]	284	115
Population	14	7
Agricultural production	97	49
Industrial production	452	144
Road freight traffic[c]	154	86
Passenger car traffic volume[d]	410	231
POLLUTION		
CO_2 emissions from energy use[e]	110	59
SO_2 emissions	16	-5
NO_x emissions	41[f]	5[f]
ENERGY		
Total primary energy supply	86	53
Total final consumption of energy	116	31
RESOURCES		
Water withdrawals	..	7[g]
Nitrogenous fertiliser use	36	10
Municipal waste[h]	129	45

a) Percent changes over the period.
b) At 2000 prices and PPPs, on the basis of the revision done by NBSC (January 2006).
c) Based on values expressed in tonne-kilometres.
d) Based on values expressed in vehicle-kilometres.
e) Excluding marine and aviation bunkers; sectoral approach.
f) To 2003.
g) Growth rate between 1993 and 2004.
h) Volume of municipal garbage.
Source: SEPA; FAO; NBSC; IEA-OECD.

EPI Framework

Environmental Performance Index score:

2 objectifs

- **Environmental Health** - reducing environmental stresses to human health
- **Ecosystem Vitality** - protecting ecosystems and natural resources

25 indicateurs (with a specific weight)

25 targets (→ proximity-to-target measure)

Index	Objectives	Policy Categories	Subcategories	Indicators	Target
EPI	Environmental Health 50%		Environmental burden of disease 25%		0 DALYs
			Water (effects on humans) 12.5%	Adequate sanitation 6.25%	100%
				Drinking water 6.25%	100%
			Air Pollution (effects on humans) 12.5%	Urban particulates 5%	20 ug/m^3
				Indoor air pollution 5%	0%
				Health ozone 2.5%	0 exceedance above 85 ppb
	Ecosystem Vitality 50%	Air Pollution (effects on ecosystems) 2.5%		Ecosystem ozone 1.25%	0 exceedance above 3,000 AOT40. AOT40 is cumulative exceedance above 40 ppb during daylight summer hours
				Sulfur dioxide emissions 1.25%	0 tons SO_2 / populated land
		Water (effects on ecosystems) 7.5%		Water quality 3.25%	100 score
				Water stress 3.25%	0% territory under water stress
		Biodiversity & Habitat 7.5%		Conservation risk index [7.5 / (2+AZE weight + MPAEEZ weight)]%	0.5 ratio
				Effective conservation [7.5 / (2+AZE weight + MPAEEZ weight)]%	10%
				Critical habitat protection* [if no AZE sites: 0; if AZE sites: 7.5 / (2+AZE weight + MPAEEZ weight)]%	100%
				Marine Protected Areas* [minimum of 7.5*EEZ area / land area and 7.5, divided by (2+AZE weight + MPAEEZ weight)]%	10%

Index	Objectives	Policy Categories	Subcategories	Indicators	Target
	Ecosystem Vitality 50%	Productive Natural Resources 7.5%	Forestry* 2.5%	Growing stock change 2.5%	ratio of at least 1
			Fisheries* 2.5%	Marine Trophic Index 1.25%	no decline
				Trawling intensity 1.25%	0%
			Agriculture* 2.5%	Irrigation Stress* 0.5%	0%
				Agricultural Subsidies 0.5%	0
				Intensive cropland 0.5%	0%
				Burned Land Area 0.5%	0%
				Pesticide Regulation 0.5%	9 banned POP chemicals and full participation in Rotterdam and Stockholm Conventions
		Climate Change 25%		Emissions per capita 8.33%	2.24 Mt CO_2 eq. (Estimated value associated with 50% reduction in global GHG emissions by 2050, against 1990 levels)
				Emissions per electricity generation 8.33%	0 g CO_2 per kWh
				Industrial carbon intensity 8.33%	0.85 tons of CO2 per $1000 (USD, 2005, PPP) of industrial GDP (Estimated value associated with 50% reduction in global GHG emissions by 2050, against 1990 levels)

2008 EPI Ranking

Rank	Country	Score
1	Switzerland	95.5
2	Sweden	93.1
3	Norway	93.1
4	Finland	91.4
5	Costa Rica	90.5
6	Austria	89.4
7	New Zealand	88.9
8	Latvia	88.8
9	Colombia	88.3
10	France	87.8
11	Iceland	87.6
12	Canada	86.6
13	Germany	86.3
14	United Kingdom	86.3
15	Slovenia	86.3
135	Iraq	53.9
136	Cambodia	53.8
137	Solomon Islands	52.3
138	Guinea	51.3
139	Djibouti	50.5
140	Guinea-Bissau	49.7
141	Yemen	49.7
142	Dem. Rep. Congo	47.3
143	Chad	45.9
144	Burkina Faso	44.3
145	Mali	44.3
146	Mauritania	44.2
147	Sierra Leone	40.0
148	Angola	39.5
149	Niger	39.1

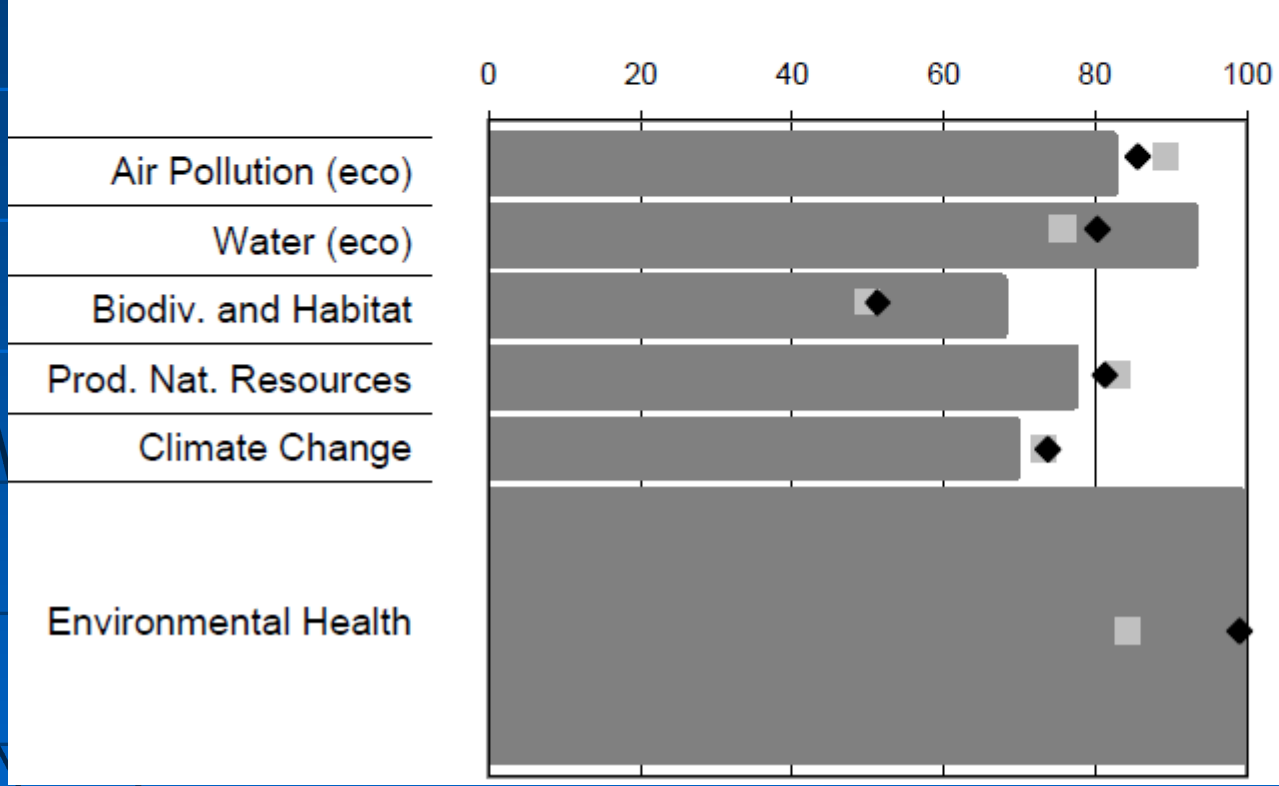
Canada

AMERICAS

GDP/capita 2005 est. (PPP) $30,278
Income Decile 1 (1=high, 10=low)

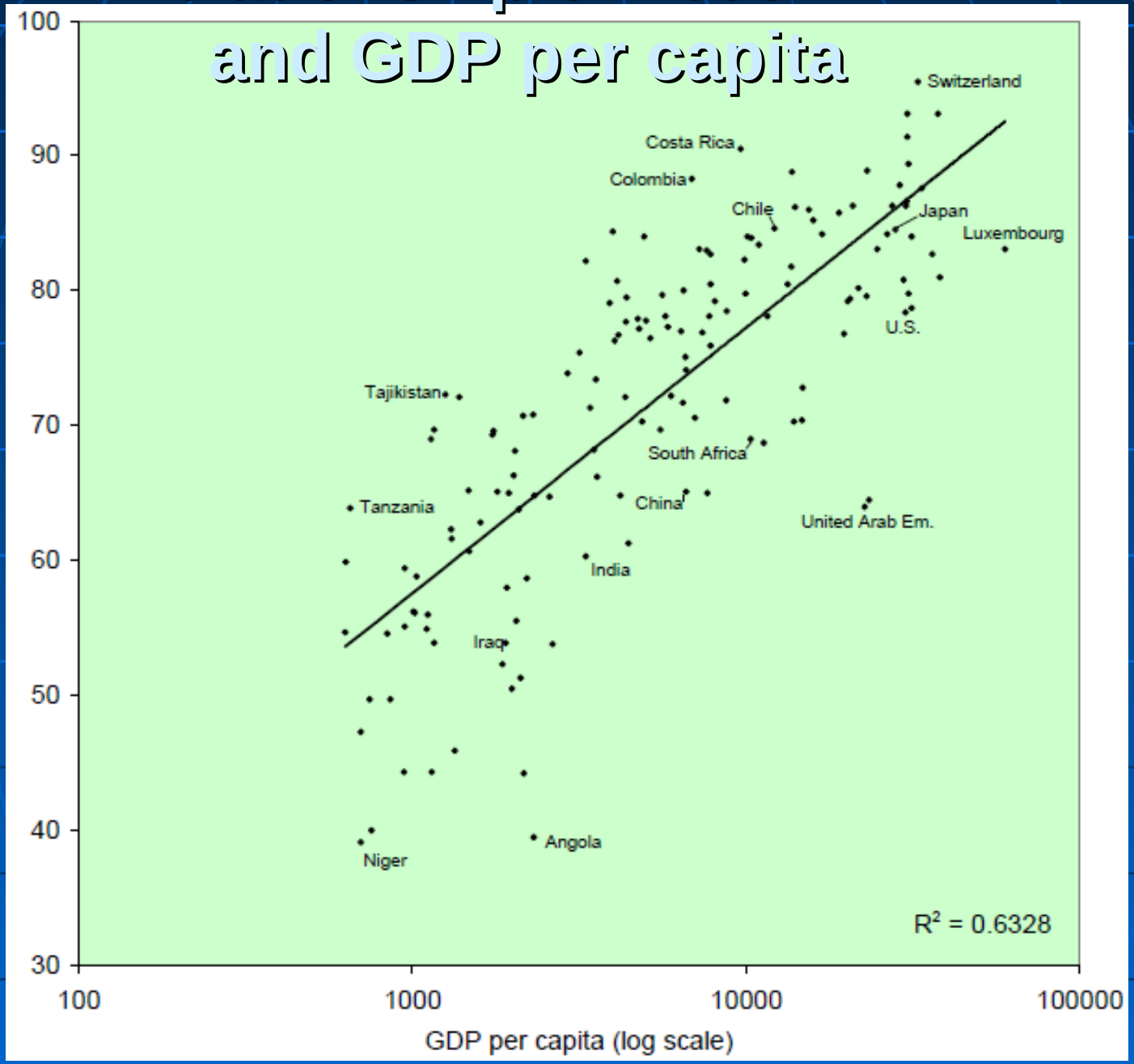
2008 EPI	
Rank:	12
Score:	86.6
Income Group Avg.	86.0
Geographic Group Avg.	78.4

Policy Categories

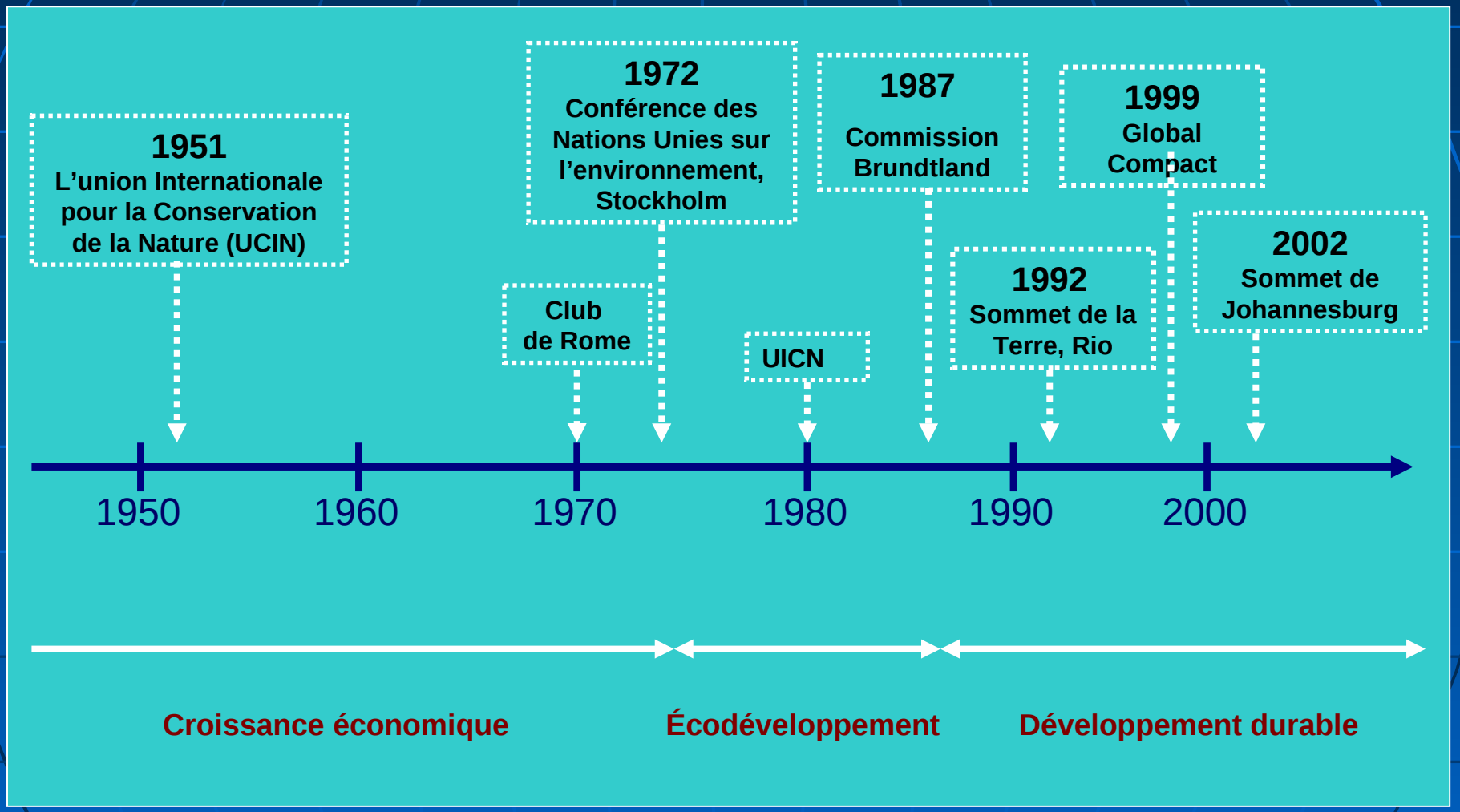


	Country	Income Group	Geographic Group
Air Pollution (eco)	82.2	85.6	89.3
Water (eco)	92.9	80.3	75.7
Biodiv. and Habitat	67.6	51.4	50.1
Prod. Nat. Resources	77.0	81.3	83.1
Climate Change	69.3	73.8	73.4
Environmental Health	98.9	99.0	84.3

Relationship of 2008 EPI and GDP per capita



L’évolution des concepts



© Haykel Najlao et Marie-France Turcotte (2006)

Développement durable

Développement qui cherche à répondre aux besoins et aux aspirations des générations présentes sans compromettre la capacité des générations futures de répondre aux leurs.

Rapport Bruntland (1987)

Développement durable : en termes plus opérationnels

- DD implique le maintien de la consommation per capita
- Pour maintenir notre consommation (c), il faut maintenir notre capacité de produire
- Celle-ci dépend du capital humain (K_H) et du capital naturel (K_N)

Développement durable : en termes plus opérationnels

- $C = F(K_H, K_N)$ où
  - C : Consommation per capita
  - K_H : Stock de capital humain per capita
  - K_N : Stock de capital naturel per capita

Développement durable

Durabilité élevée : À consommation par capita constante, les 2 capitaux doivent être constants.

Ressources renouvelables : regénération des forêts,

Ressources non-renouvelables : consommer le pétrole au rythme où on trouve des gisements

- Ressources environnementales (eau, air) : respecter les seuils de tolérance

Développement durable

Durabilité faible : À consommation par capita constante, l'ensemble des 2 capitaux doit être constant.

FONDS PERMANENT EN ALASKA

- L’exploitation des champs pétrolifères d’Alaska génère des revenus substantiels, mais déprécie l’un des principaux atouts environnementaux de l’état.
- Le fonds a été créé pour les générations à venir.
- Au moins 25 % des revenus pétroliers sont mis de côté dans le fonds, qui ne peut être investi que dans des actifs productifs.

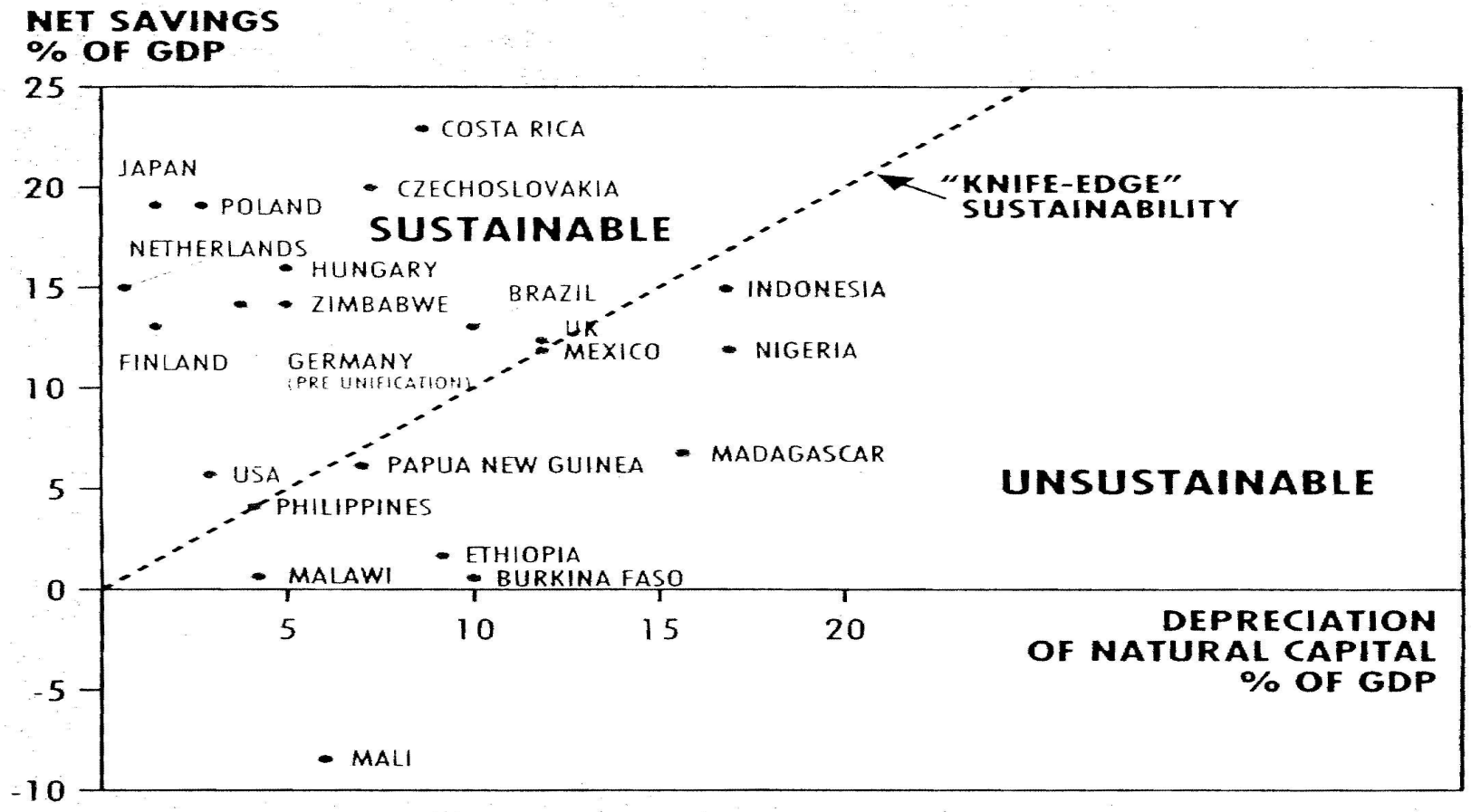
Développement durable

- Il n’y a pas de réponse à la question générale : Jusqu’à quel point peut-on substituer le K_H au K_N? La réponse est autant une question de goût que d’éthique (Perman, 2003)
- Il n'y a pas de substitut à l'eau, ni l'air.

- Le capital humain peut représenter un substitut pour certains matériaux provenant de la nature (le bois), mais pas pour des services de soutien de la vie.

Figure 1

A MEASURE OF SUSTAINABLE DEVELOPMENT



TRIPLE BILAN

- TRIPLE P: Profits, People, Planet
  = Environnement, Social, Économie

- La *Déclaration de* Johannesburg stipule que le développement économique, le développement social et la protection de l'environnement constituent les piliers du DD; ils sont interdépendants et se renforcent mutuellement.

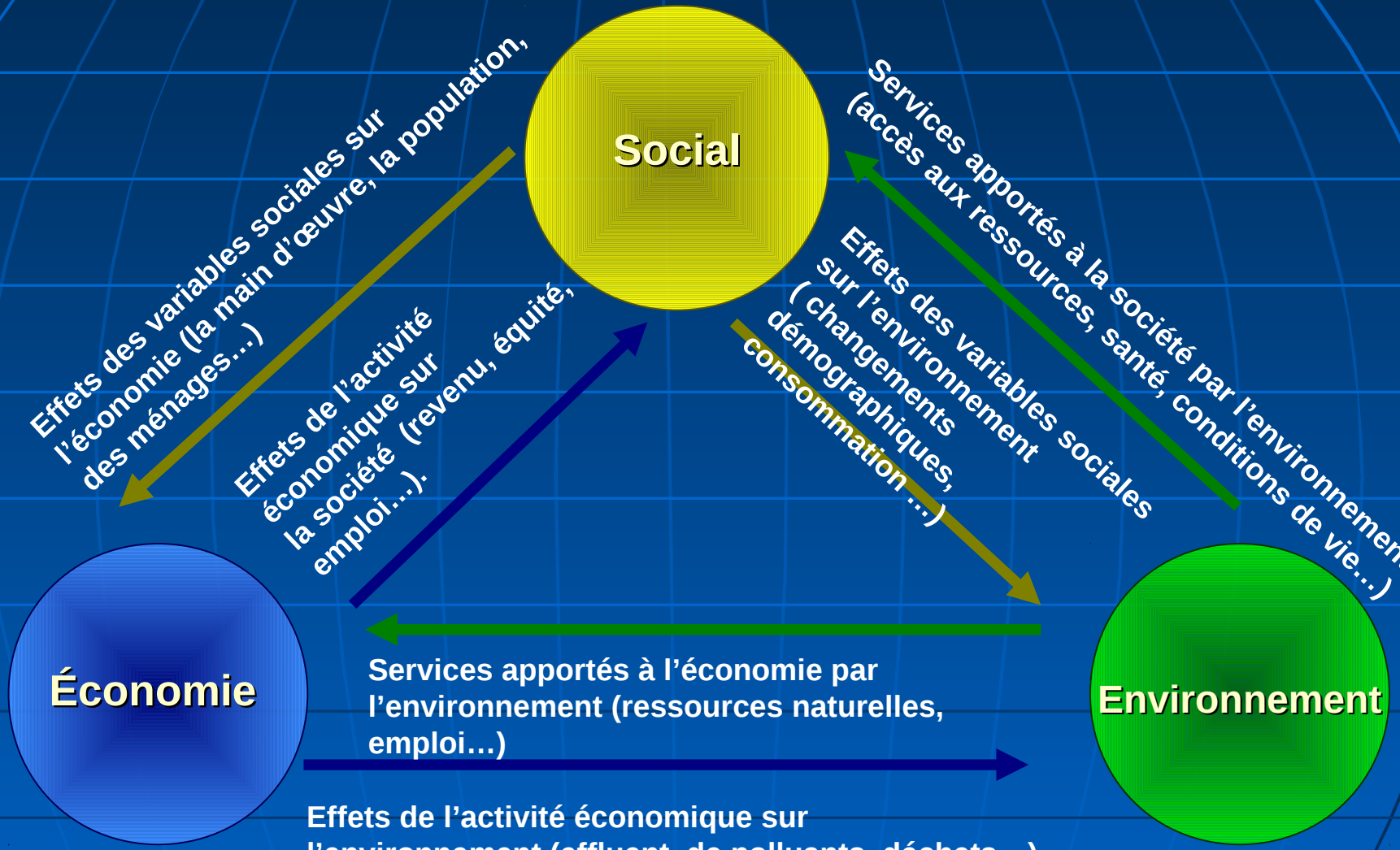
- Développement durable ou « souhaitable »

Les facettes du développement durable : une hiérarchie?

1. **L ’environnement :** l ’intégrité écologique est une condition
2. **L ’économie :** le développement économique est un moyen
3. **Le social :** Le développement social et humain est un objectif

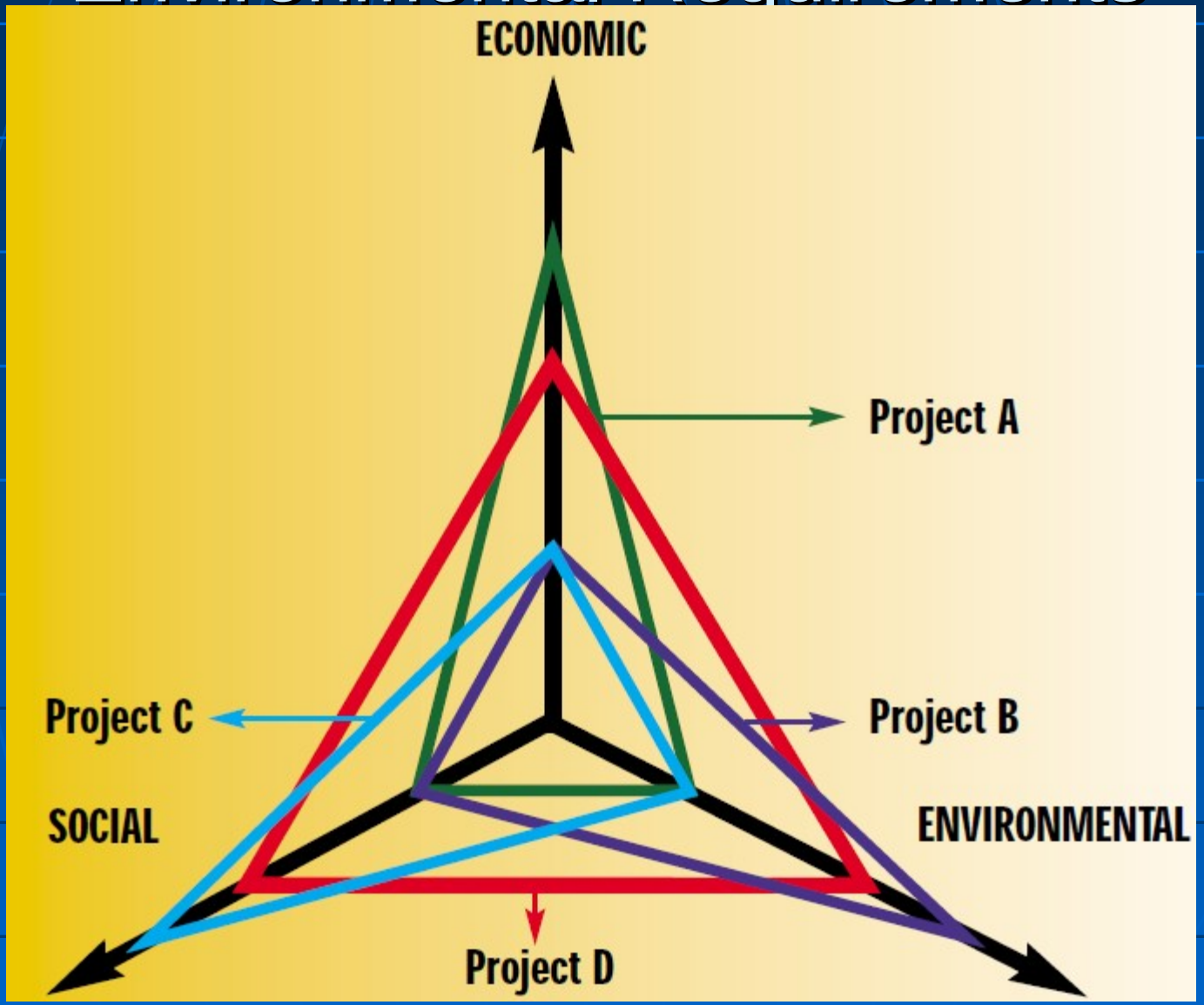
Gendron et Réverêt (2000)

Les trois dimensions du développement



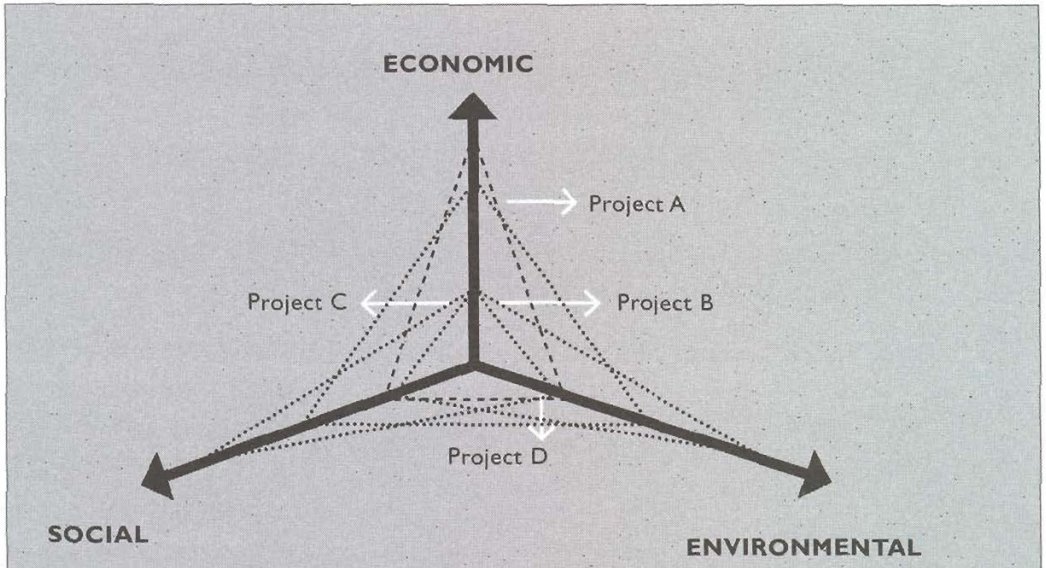
© Najlaoui 2006, inspiré de OCDE, 2006

Satisfying Economic, Social, and Environmental Requirements



Smith and Jalal (2000) Sustainable Development in Asia

Box 2-1. Balancing Project Benefits



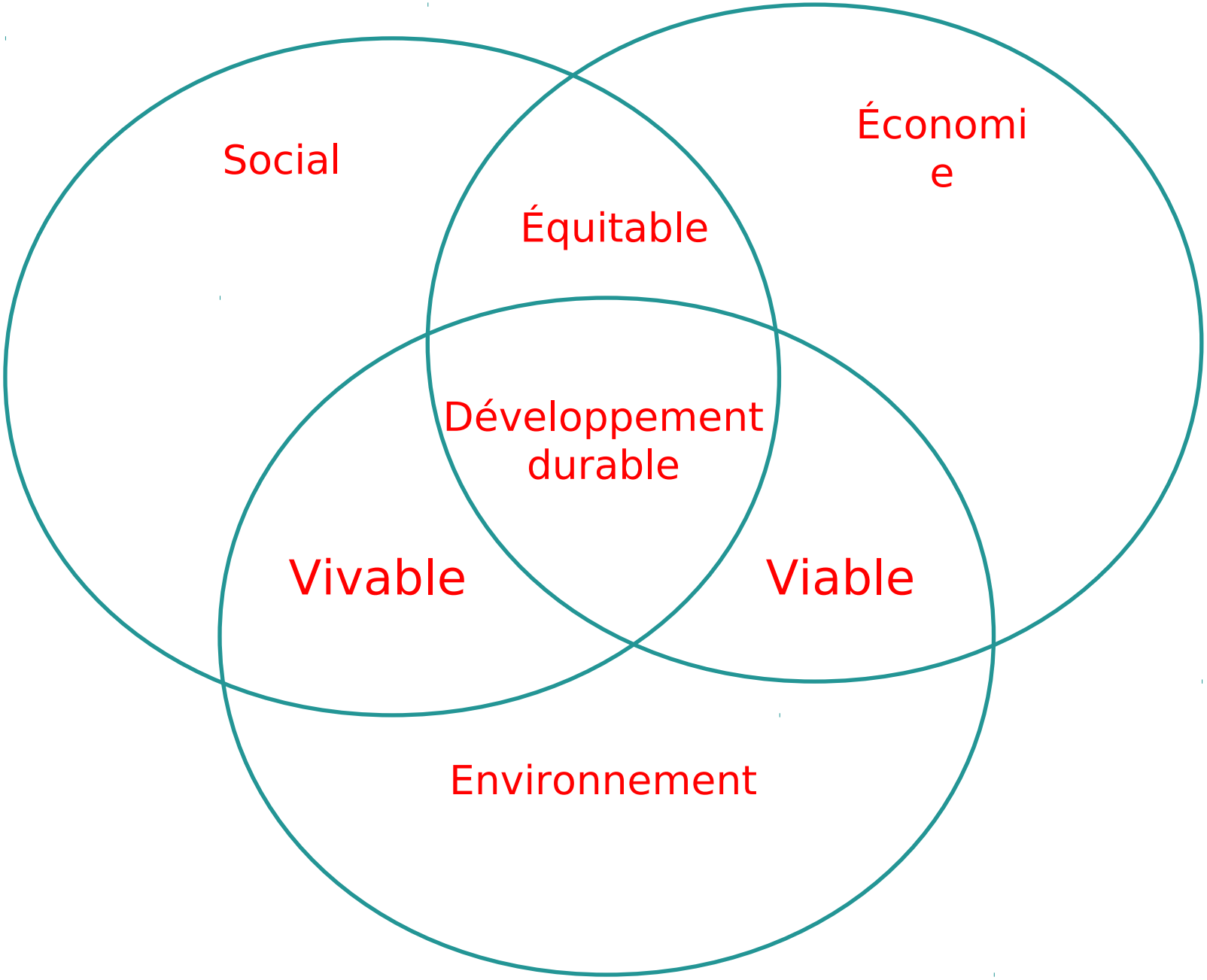
Project A – Large-scale irrigation project with high economic returns: rich farmers benefit, but causes schistosomiasis among local people, who are not direct beneficiaries: poor farmers may become landless laborers

Project B – Save the spotted deer or rhinoceros

Project C – Subsidized hospital project in a sparsely populated urban area

Project D – Rural water supply project, which benefits the poor and women in particular, improves quantity and quality of available water, and at low cost.

Source: D.V. Smith and K. F. Jalal (2000), p. 3

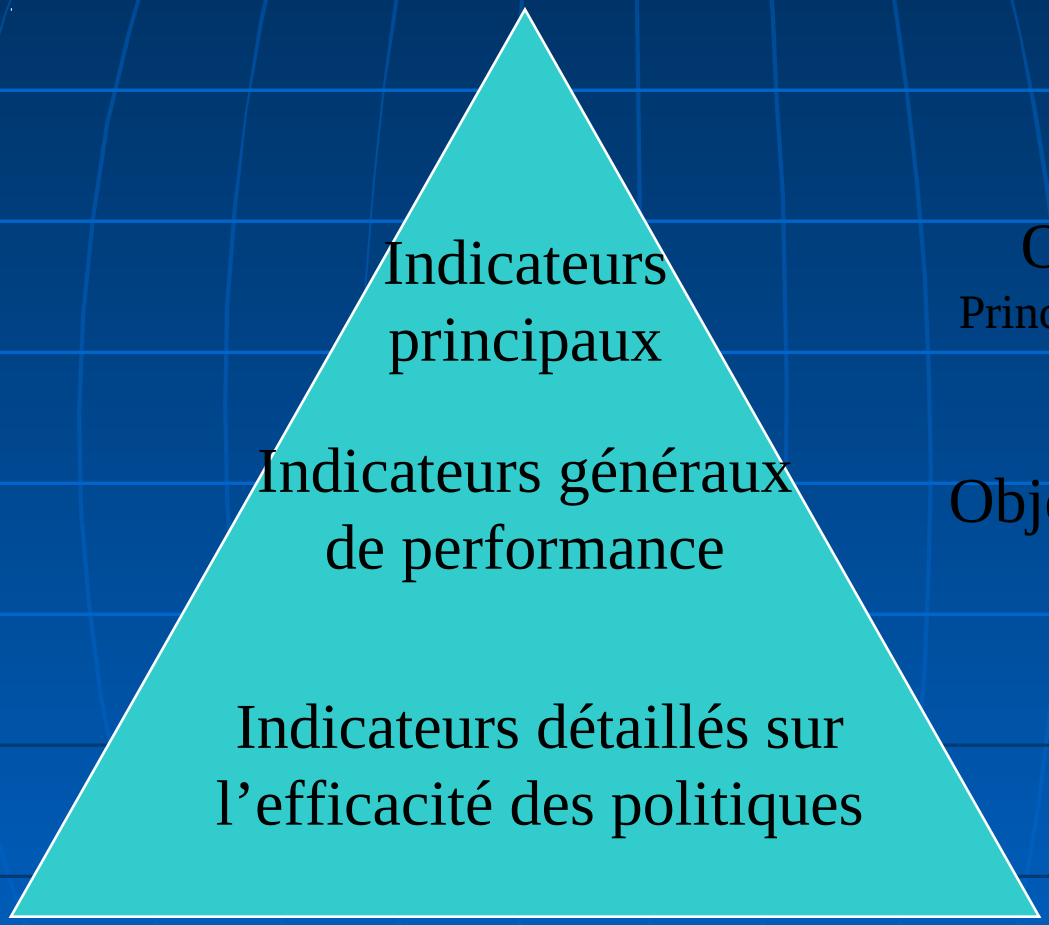

Social
Économie
Équitable
Développement durable
Vivable
Viable
Environnement

La jungle des 300 indicateurs de développement durable

Les principaux indicateurs d'EUROSTAT

Thèmes IDD	Principaux indicateurs
Développement économique	Taux de croissance du PIB par
Pauvreté et exclusion sociale	Taux de risque de pauvreté
Société vieillissante	Taux de dépendance vieillesse
Santé publique	Espérance de vie en bonne
Changt climatique et énergie	Emissions de gaz à effet de s Consommation totale d'énergie
Production et conso. durables	Productivité des ressources
Gestion des ressources naturelles	Indice d' oiseaux des champs Prises de poissons hors-LBS
Transport	Consommation d'énergie des transports
Bonne gouvernance	Niveau de confiance des citoyens
Partenariat global	Aide publique au développement

Pyramide des indicateurs



niveau 1

12

niveau 2

45

niveau 3

98

Objectifs généraux

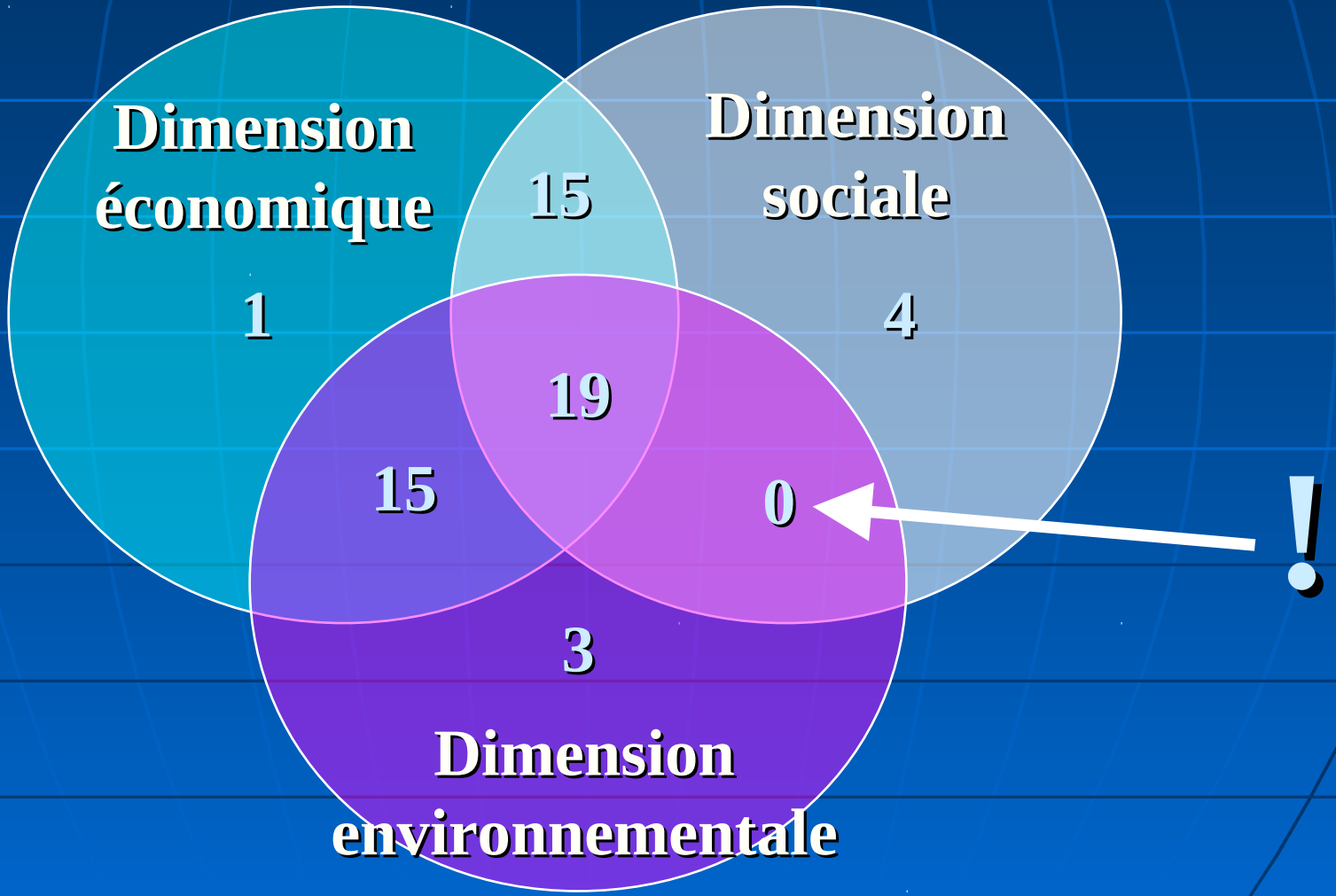
Principales questions politiques

Objectifs opérationnels de la SDD

Actions

Variables explicatives

Intégration des indicateurs entre les piliers



Indicateurs de DD du Québec: 17 mesures de capital – juin 2009

- Capital Humain [Taux d'activité, espérance de vie en bonne santé, niveau de scolarité]
- Capital Social [Personnes ayant un haut niveau de soutien social, temps alloué au travail communautaire, répartition du revenu, part de la culture et des communications dans l'économie]
- Capital produit [Stock net de K fixe, valeur foncière du parc immobilier]
- Capital Financier [Avoir net des ménages, actifs financiers du gouvernement]
- Capital Naturel [Superficie des territoires en aires protégées, superficie du territoire zoné agricole, état des écosystèmes forestiers, qualité de l'eau, pourcentage de jours sans smog, tendances des températures moyennes annuelles]

Exercice en classe

- En vous servant du diagramme de Venn en trois cercles, quels seraient les 10 - 15 indicateurs les plus pertinents pour une entreprise comme « Le CH » ?
- http://canadiens.nhl.com/club/l_fr/index.htm
- Économie : CA, profits, taux d'utilisation du Centre Bell
- Social : Nombre d'employés, SST, formation
- Environnement : Nombre de points d'accès au réseau de transport en commun à moins de 3 min à pied du Centre Bell, déchets, transport aérien, % des matières résiduelles recyclés, consommation d'énergie
- Env, Eco : % de matières recyclés dans les produits dérivés
- Soc, Eco : Retombées économiques, dons (fonds), salaire du mieux payé / salaire du plus mal payé
- Soc, Env : % des partisans qui viennent en transport en commun,
- Eco, Env, Soc : Nombre de match en série

Reporting Initiatives

- UN Global Compact
- *Global Reporting Initiative* (GRI)

UN Global Compact

HUMAN RIGHTS

Principle 1 Businesses should support and respect the protection of internationally proclaimed human rights; and

Principle 2 make sure that they are not complicit in human rights abuses.

LABOUR

Principle 3 Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;

Principle 4 the elimination of all forms of forced and compulsory labour;

Principle 5 the effective abolition of child labour; and

Principle 6 the elimination of discrimination in respect of employment and occupation.

ENVIRONMENT

Principle 7 Businesses are asked to support a precautionary approach to environmental challenges;

Principle 8 undertake initiatives to promote greater environmental responsibility; and

Principle 9 encourage the development and diffusion of environmentally friendly technologies.

ANTI-CORRUPTION

Principle 10 Businesses should work against corruption in all its forms, including extortion and bribery.

UN Global Compact

- UN Global Compact is the world's largest corporate citizenship and sustainability initiative
- Official launch on 26 July 2000
- More than 7,700 participants
- Including over 5,300 businesses
- 130 countries around the world
- Commitment to an annual **Communication on Progress** (COP)
- Participant search:

http://www.unglobalcompact.org/participants/search

UN Global Compact (2009)

Global Reporting Initiative

- Network-based organization developing a **sustainability reporting framework**
- Started in 1997, UNEP joins in 1999
- 2000: first guidelines
- 2010: 586 organizations
- 55 countries around the world
- GRI Report List:

http://www.globalreporting.org/ReportServices/GRIRep

9 Economic Indicators

Economic

Economic Performace

EC1	Economic value generated and distributed, including revenues, operating costs, employee compensation, donations and other community investments, retained earnings, and payments to capital providers and governments.(Core)
EC2	Financial implications and other risks and opportunities for the organization's activities due to climate change. (Core)
EC3	Coverage of the organization's defined benefit plan obligations. (Core)
EC4	Significant financial assistance received from government. (Core)

Market Presence

EC5	Range of ratios of standard entry level wage compared to local minimum wage at significant locations of operation. (Additional)
EC6	Policy, practices, and proportion of spending on locally-based suppliers at significant locations of operation. (Core)
EC7	Procedures for local hiring and proportion of senior management hired from the local community at significant locations of operation. (Core)

Indirect Economic Impacts

EC8	Development and impact of infrastructure investments and services provided primarily for public benefit through commercial, in-kind, or pro bono engagement. (Core)
EC9	Understanding and describing significant indirect economic impacts, including the extent of impacts. (Additional)

30 Environmental Indicators

Environmental

Materials

EN1	Materials used by weight or volume. (Core)
EN2	Percentage of materials used that are recycled input materials. (Core)

Energy

EN3	Direct energy consumption by primary energy source. (Core)
EN4	Indirect energy consumption by primary source. (Core)
EN5	Energy saved due to conservation and efficiency improvements. (Additional)
EN6	Initiatives to provide energy-efficient or renewable energy based products and services, and reductions in energy requirements as a result of these initiatives. (Additional)
EN7	Initiatives to reduce indirect energy consumption and reductions achieved. (Additional)

Water

EN8	Total water withdrawal by source. (Core)
EN9	Water sources significantly affected by withdrawal of water. (Additional)
EN10	Percentage and total volume of water recycled and reused. (Additional)

Biodiversity

EN11	Location and size of land owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas. (Core)
EN12	Description of significant impacts of activities, products, and services on biodiversity in protected areas and areas of high biodiversity value outside protected areas. (Core)
EN13	Habitats protected or restored. (Additional)
EN14	Strategies, current actions, and future plans for managing impacts on biodiversity. (Additional)
EN15	Number of IUCN Red List species and national conservation list species with habitats in areas affected by operations, by leve of extinction risk. (Additional)

Emissions, Effluents, and Waste

EN16	Total direct and indirect greenhouse gas emissions by weight. (Core)
EN17	Other relevant indirect greenhouse gas emissions by weight. (Core)
EN18	Initiatives to reduce greenhouse gas emissions and reductions achieved. (Additional)
EN19	Emissions of ozone-depleting substances by weight. (Core)
EN20	NOx, SOx, and other significant air emissions by type and weight. (Core)
EN21	Total water discharge by quality and destination. (Core)
EN22	Total weight of waste by type and disposal method. (Core)
EN23	Total number and volume of significant spills. (Core)
EN24	Weight of transported, imported, exported, or treated waste deemed hazardous under the terms of the Basel Convention Annex I, II, III, and VIII, and percentage of transported waste shipped internationally. (Additional)
EN25	Identity, size, protected status, and biodiversity value of water bodies and related habitats significantly affected by the reporting organization's discharges of water and runoff. (Additional)

Products and Services

EN26	Initiatives to mitigate environmental impacts of products and services, and extent of impact mitigation. (Core)
EN27	Percentage of products sold and their packaging materials that are reclaimed by category. (Core)

Compliance

EN28	Monetary value of significant fines and total number of non-monetary sanctions for non-compliance with environmental laws and regulations. (Core)

Transport

EN29	Significant environmental impacts of transporting products and other goods and materials used for the organization's operations, and transporting members of the workforce. (Additional)

Overall

EN30	Total environmental protection expenditures and investments by type. (Additional)

14 Labor Indicators

Social Performance: Labor Practices & Decent Work

Employment

LA1	Total workforce by employment type, employment contract, and region. (Core)
LA2	Total number and rate of employee turnover by age group, gender, and region. (Core)
LA3	Benefits provided to full-time employees that are not provided to temporary or part-time employees, by major operations. (Additional)

Labor/Management Relations

LA4	Percentage of employees covered by collective bargaining agreements. (Core)
LA5	Minimum notice period(s) regarding significant operational changes, including whether it is specified in collective agreements (Core)

Occupational Health and Safety

LA6	Percentage of total workforce represented in formal joint management-worker health and safety committees that help monitor and advise on occupational health and safety programs. (Additional)
LA7	Rates of injury, occupational diseases, lost days, and absenteeism, and number of work-related fatalities by region. (Core)
LA8	Education, training, counseling, prevention, and risk-control programs in place to assist workforce members, their families, o community members regarding serious diseases. (Core)
LA9	Health and safety topics covered in formal agreements with trade unions. (Additional)

Training and Education

LA10	Average hours of training per year per employee by employee category. (Core)
LA11	Programs for skills management and lifelong learning that support the continued employability of employees and assist then in managing career endings. (Additional)
LA12	Percentage of employees receiving regular performance and career development reviews. (Additional)

Diversity and Equal Opportunity

LA13	Composition of governance bodies and breakdown of employees per category according to gender, age group, minority grou membership, and other indicators of diversity. (Core)
LA14	Ratio of basic salary of men to women by employee category. (Core)

9 Human Right Indicators

Social Performance: Human Rights

Investment and Procurement Practices

HR1	Percentage and total number of significant investment agreements that include human rights clauses or that have undergon human rights screening. (Core)
HR2	Percentage of significant suppliers and contractors that have undergone screening on human rights and actions taken. (Core
HR3	Total hours of employee training on policies and procedures concerning aspects of human rights that are relevant to operations, including the percentage of employees trained. (Additional)

Non-Discrimination

HR4	Total number of incidents of discrimination and actions taken. (Core)

Freedom of Association and Collective Bargaining

HR5	Operations identified in which the right to exercise freedom of association and collective bargaining may be at significant risk and actions taken to support these rights. (Core)

Child Labor

HR6	Operations identified as having significant risk for incidents of child labor, and measures taken to contribute to the eliminatio of child labor. (Core)

Forced and Compulsory Labor

HR7	Operations identified as having significant risk for incidents of forced or compulsory labor, and measures to contribute to the elimination of forced or compulsory labor. (Core)

Security Practices

HR8	Percentage of security personnel trained in the organization's policies or procedures concerning aspects of human rights that are relevant to operations. (Additional)

Indigenous Rights

HR9	Total number of incidents of violations involving rights of indigenous people and actions taken. (Additional)

Une approche de rechange : l'empreinte écologique

- Métaphore utilisée pour illustrer la superficie terrestre ou marine hypothétiquement nécessaire à une population pour produire les ressources nécessaires à sa survie et absorber les déchets qu'elle génère, compte tenu des technologies du moment.
- Le terme a été créé par l'écologiste canadien William Rees.

Empreinte écologique

- Les calculs définissent généralement une superficie terrestre utilisée, exprimée en « hectares globaux » (hag) par personne.

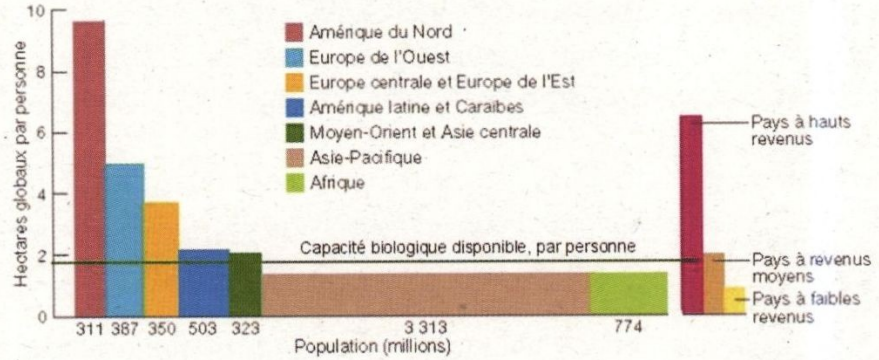
- En ce moment, la part de terre disponible par personne est de 1,9 hag
  - États-Unis : 9,5 hag
  - Chine : 1,5 hag
  - Québec: 6 hag (Rapport du CDD, déc. 2007)

Calculez votre propre empreinte écologique :
http://www.earthday.net/footprint/index.asp

http://www.cite-sciences.fr/francais/ala_cite/expositions/developp

WWF

EMPREINTE ÉCOLOGIQUE, par région et groupe de revenus, 1999

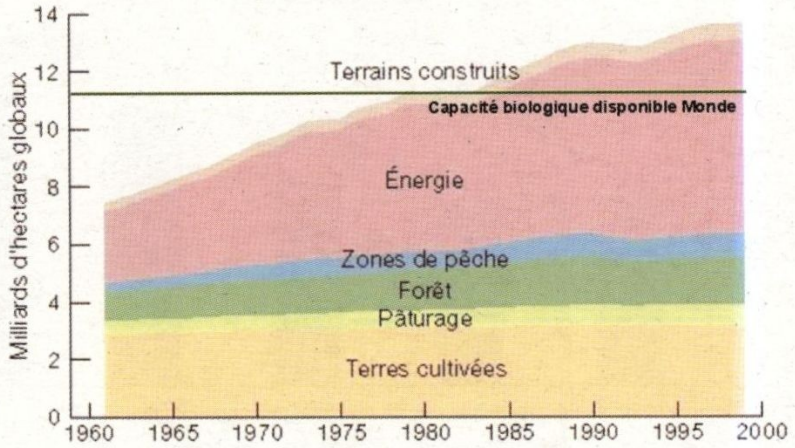


L'empreinte écologique des pays à hauts revenus est 6 fois supérieure à celle des pays à faibles revenus, et 3 fois supérieure à la capacité mondiale.

Source : WWF

WWF

EMPREINTE ÉCOLOGIQUE MONDIALE, 1961–1999

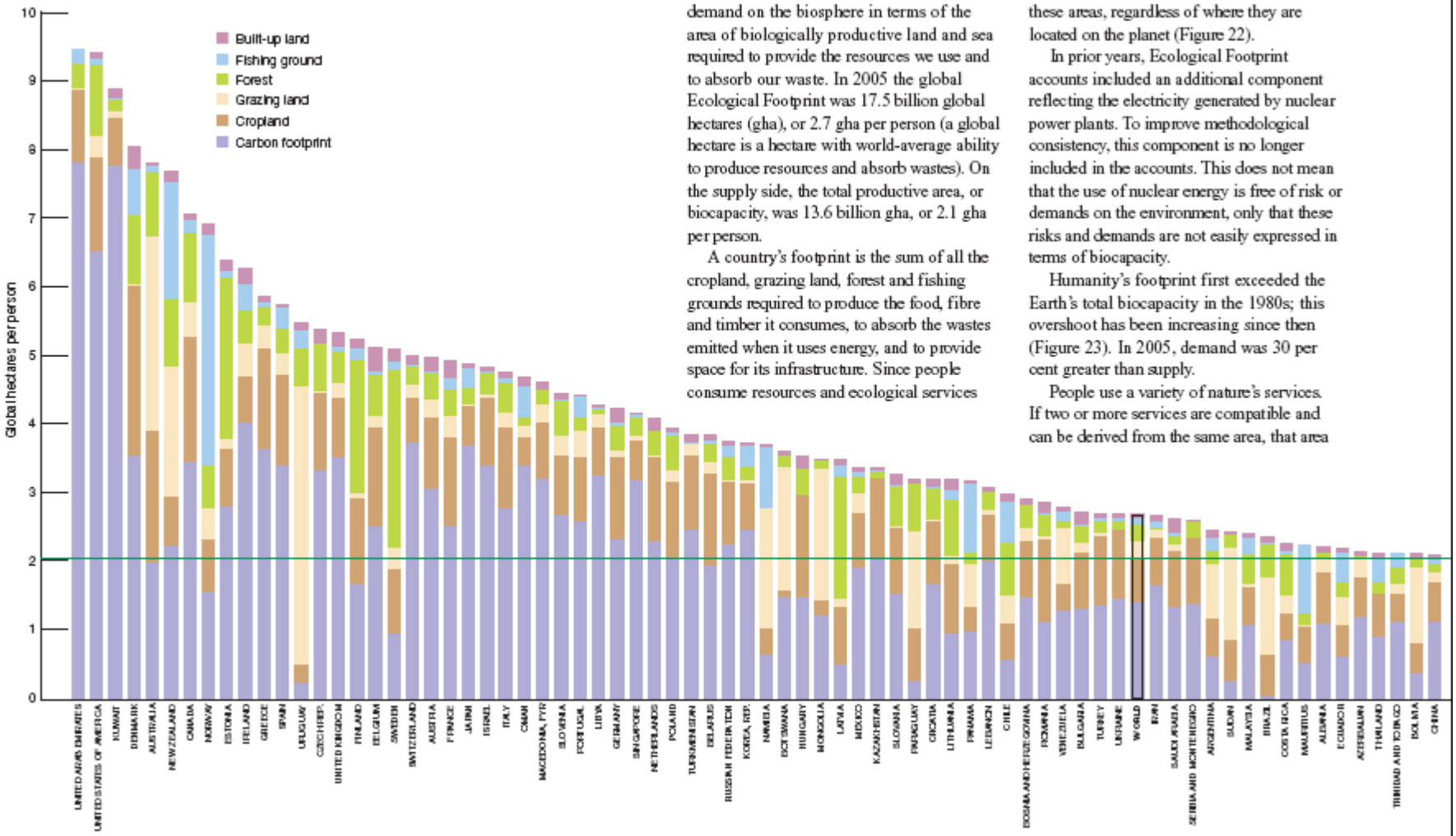


En 1999, l'empreinte écologique mondiale dépassait la capacité biologique de la planète de plus de 20 %

Source : WWF

ECOLOGICAL FOOTPRINT OF NATIONS

Fig. 22: **ECOLOGICAL FOOTPRINT PER PERSON, BY COUNTRY,** 2005



The Ecological Footprint measures humanity's demand on the biosphere in terms of the area of biologically productive land and sea required to provide the resources we use and to absorb our waste. In 2005 the global Ecological Footprint was 17.5 billion global hectares (gha), or 2.7 gha per person (a global hectare is a hectare with world-average ability to produce resources and absorb wastes). On the supply side, the total productive area, or biocapacity, was 13.6 billion gha, or 2.1 gha per person.

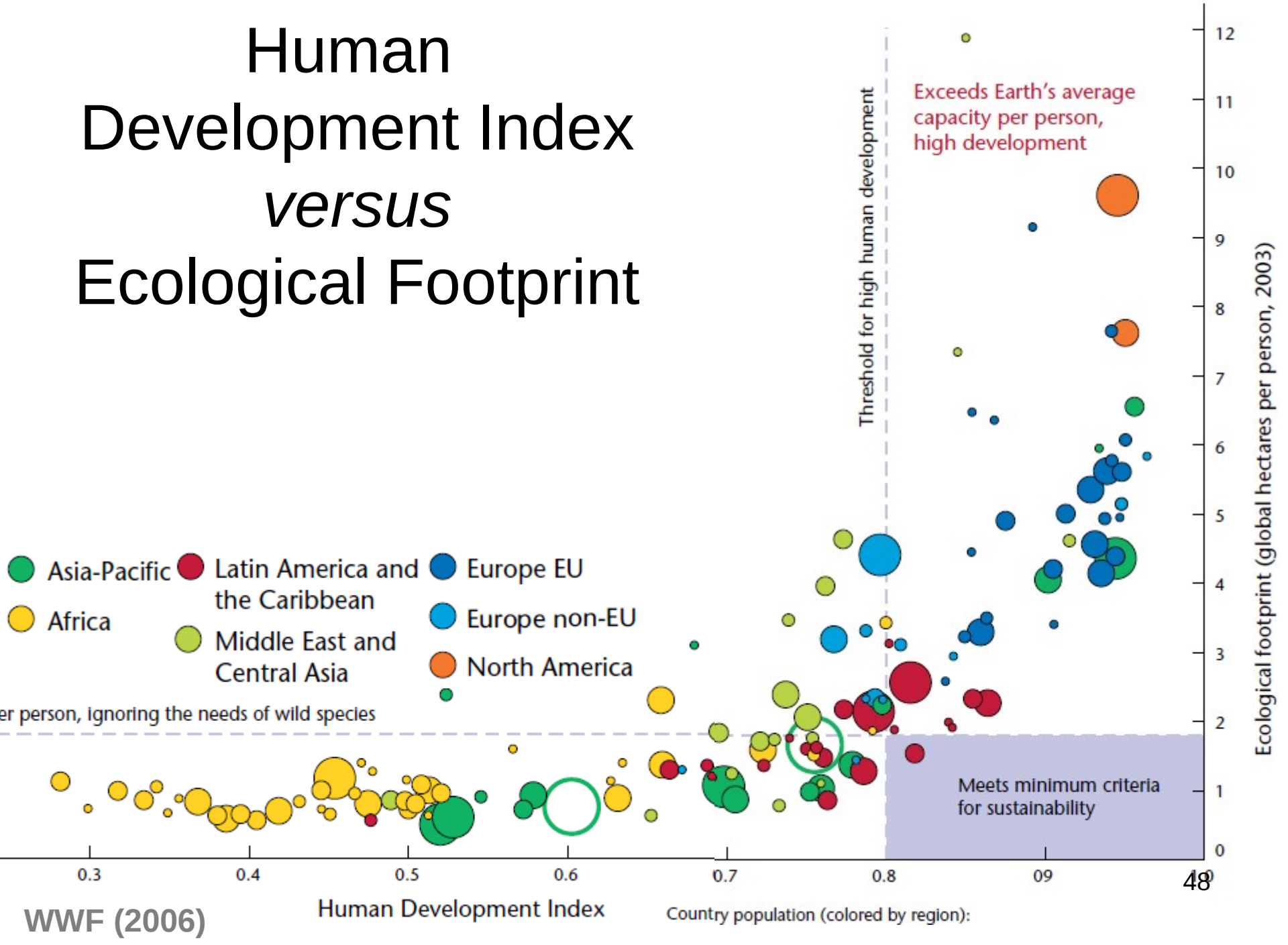
A country's footprint is the sum of all the cropland, grazing land, forest and fishing grounds required to produce the food, fibre and timber it consumes, to absorb the wastes emitted when it uses energy, and to provide space for its infrastructure. Since people consume resources and ecological services from all over the world, their footprint sums these areas, regardless of where they are located on the planet (Figure 22).

In prior years, Ecological Footprint accounts included an additional component reflecting the electricity generated by nuclear power plants. To improve methodological consistency, this component is no longer included in the accounts. This does not mean that the use of nuclear energy is free of risk or demands on the environment, only that these risks and demands are not easily expressed in terms of biocapacity.

Humanity's footprint first exceeded the Earth's total biocapacity in the 1980s; this overshoot has been increasing since then (Figure 23). In 2005, demand was 30 per cent greater than supply.

People use a variety of nature's services. If two or more services are compatible and can be derived from the same area, that area

Human Development Index *versus* Ecological Footprint



WWF (2006)