

# **Sustainability**

**- Explain it with your own terms**

Japan for Sustainability/ Eco Networks

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# My Brief Background

- Environmental Economics & Policies (UC Berkeley)
  - Thesis: Community currency and game theory
  - Book translation “Future of Money”
- Japan for Sustainability (Communication Platform)
  - JFS Sustainability Index
  - Meets the Press
- Eco Networks Co. (Sustainability Consulting Firm)
  - Consulting
    - Sustainability visions/targets
    - Corporate Sustainability Reporting
  - Communication
    - Dialogue (company and NGOs, investors, academics, government, etc.)
    - Translation (Ministry of Environment, IGES, METI, etc.)
  - Software
    - “see-it”

# Japan for Sustainability



Established : August 2002

Chief Executive : Ms.Edahiro, Mr.Tada

Director: Prof.Yamamoto, Prof. Mitsuhashi,  
Lester Brown

<http://www.japanfs.org/index.html>

We share information on developments and activities originating in Japan that lead toward sustainability, with the aim of building momentum toward a sustainable path for the world.

# Network

- Subscribers from 191 countries
- Website access 100,000-
- Supported by Online volunteers
- More than 500 volunteers around the world
- Diversity : vocation, age, gender, region/country
- Membership: 70 corporate, 200 individuals

# Activities

1. Provides a variety of information on the environment and sustainability, from Japan to the world, via our web site and e-mail magazines.
2. Covers not only current developments but also traditional wisdom, craftsmanship and practices of day-to-day life, as well as local activities.
3. Works to develop special partnerships with people in Asia, in order to cooperate to find paths toward sustainability in this region.
4. Welcomes feedback and comments from overseas and shares them in Japan and with partners in Asia, so that we can improve efforts and activities in this region by learning from each other.
5. **Creates a vision for a sustainable Japan through discussion among various stakeholders.**

# Goal

Imagine that we are holding “World Summit on Sustainable Development” in this room.

You should be able to present the followings;

- what is sustainability (with your own terms)
- what is your vision/strategies/policies for sustainability (with your own logic)

# Plan

10/19

- Session 1. - What is sustainability?
- countries and int'l communities
  - measurement and tracking

- Session 2. - vision & indicators
- Individual work / share

10/26

- Session 1. - Presentation (15 minutes each)

- Session 2. - Discussion
- Latest policy framework

# Session 1

- Communication exercise

1) What is Sustainability?

(Background and Definitions)

2) How are we responding?

(National/International strategies and indicators)

3) How do we measure and track it?



# Communication First

- Why communication first?
- As ...
  - An Engineer
    - Research Proposal / Budget
  - A Policy Maker
    - Different countries and interests
  - A Business Person
    - 80-90% of the time

# Communication Exercise

## “Date Game”

Your name/ country/ home town	Research interest
Your “personal” eco/sustainability policy	What you would write about on JFS newsletter

Prep: 5 minutes

Communicate: 15 minutes

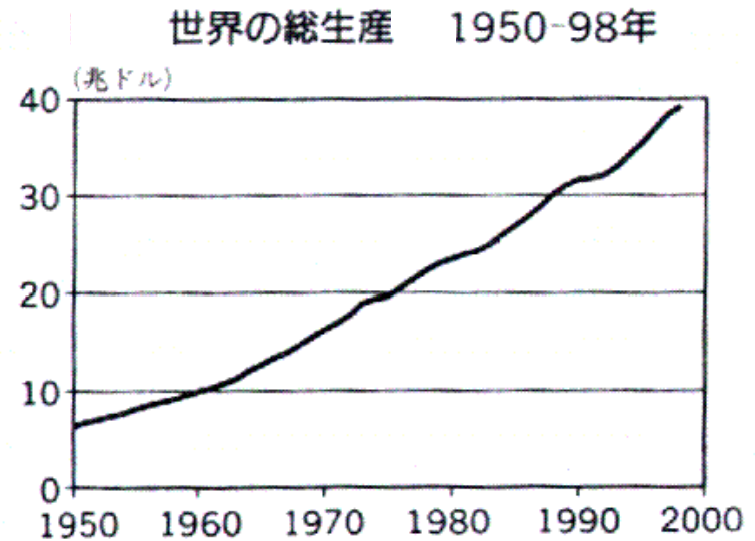
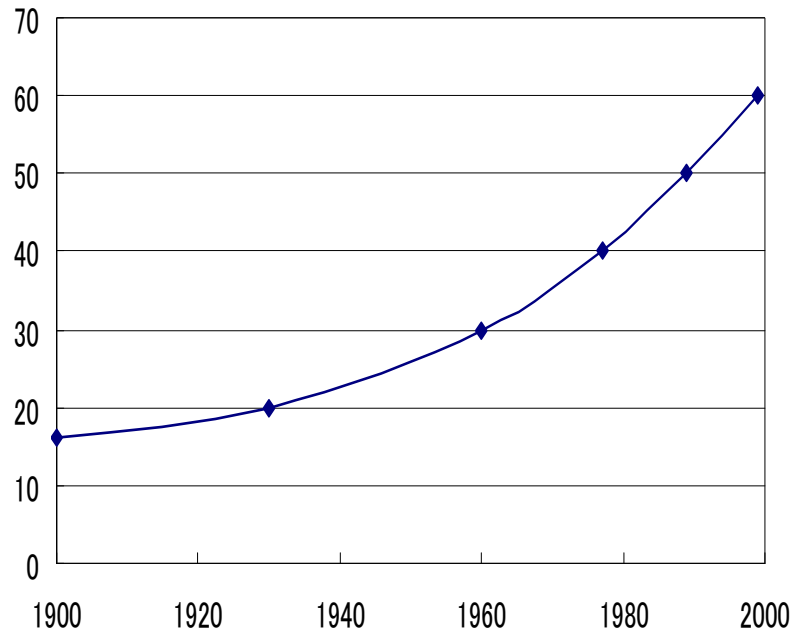
1) What is sustainability?  
(Background and definitions)

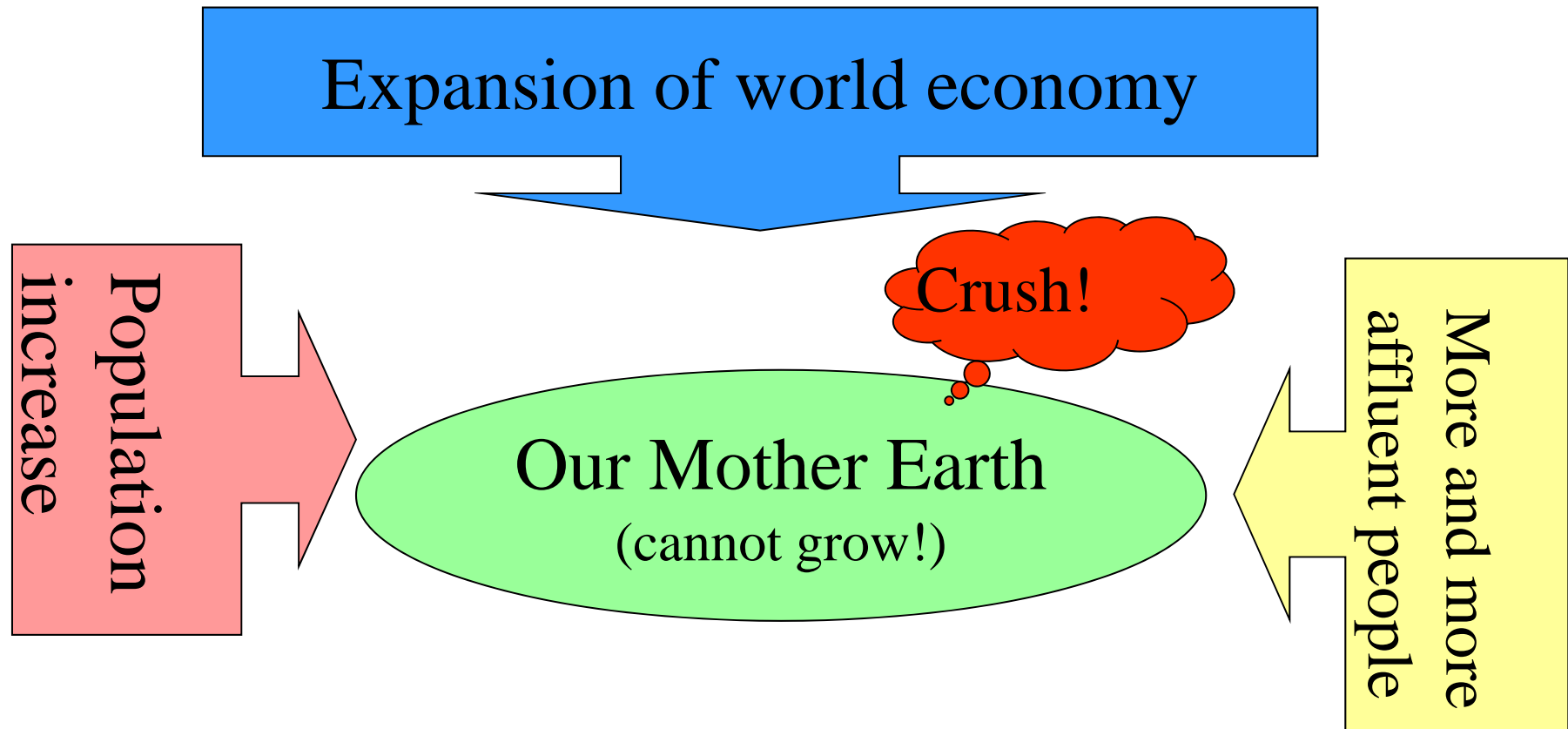
# Background: Root causes of global environmental crisis

Population



World Economy





$$\text{Impact} = \text{Population} \times \text{Affluence} \times \text{Technology}$$

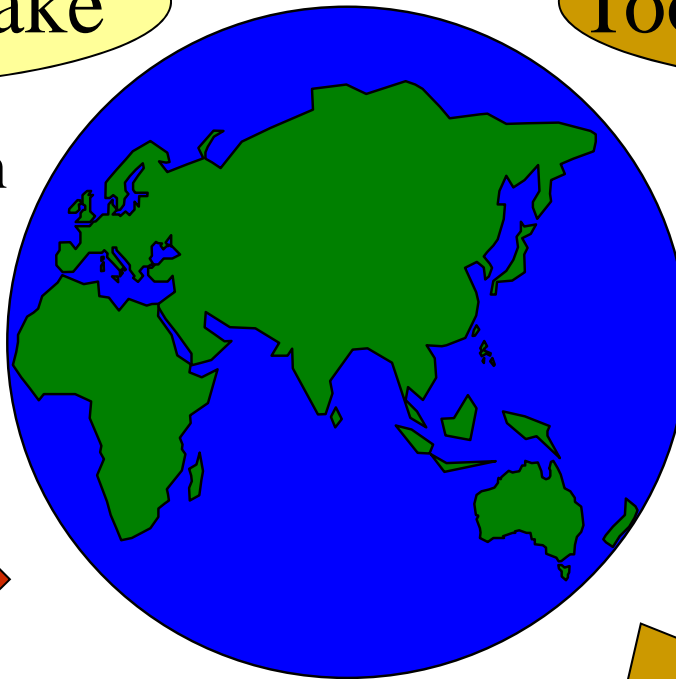
# Root causes are...

## Too much intake

- Resource depletion
- Lowing aquifers
- Shrinking forests

## Too much emission

- CO<sub>2</sub>/ GHGs
- Wastes
- Toxic Substances
- NO<sub>x</sub>, SO<sub>x</sub>...



“If everyone lived as we do in the UK we’d need three planets to support us.”

# What is Sustainability?

## **Webster's New International Dictionary**

"Sustain - to cause to continue (as in existence or a certain state, or in force or intensity); to keep up, especially without interruption diminution, flagging, etc.; to prolong."

*Webster's New International Dictionary.*

(Springfield, Mass.: Merriam-Webster Inc., 1986)

# What is Sustainability?

## **Our Common Future**

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

*Page 8, World Commission on Environment and Development. Our Common Future. (Oxford, Great Britain: Oxford University Press, 1987). (Frequently referred to as the Brundtland report after Gro Harlem Brundtland, Chairman of the Commission)*



# What is Sustainability?

## **World Business Council on Sustainable Development**

"Sustainable development involves the simultaneous pursuit of economic prosperity, environmental quality and social equity. Companies aiming for sustainability need to perform not against a single, financial bottom line but against the triple bottom line."

# What is Sustainability?

## **World Business Council on Sustainable Development (cont.)**

"Over time, human and social values change. Concepts that once seemed extraordinary (e.g. emancipating slaves, enfranchising women) are now taken for granted. New concepts (e.g. responsible consumerism, environmental justice, intra- and inter-generational equity) are now coming up the curve."

<http://www.wbcasd.ch/>

# What is Sustainability?

## **Interfaith Center on Corporate Responsibility (ICCR)**

"Sustainable development...[is] the process of building equitable, productive and participatory structures to increase the economic empowerment of communities and their surrounding regions.

**Interfaith Center on Corporate Responsibility**

# What is Sustainability?

**Jerry Sturmer**

**Santa Barbara South Coast Community  
Indicators**

“Sustainability is meeting the needs of all humans, being able to do so on a finite planet for generations to come while ensuring some degree of openness and flexibility to adapt to changing circumstances.”

[JSturmer@aol.com](mailto:JSturmer@aol.com)

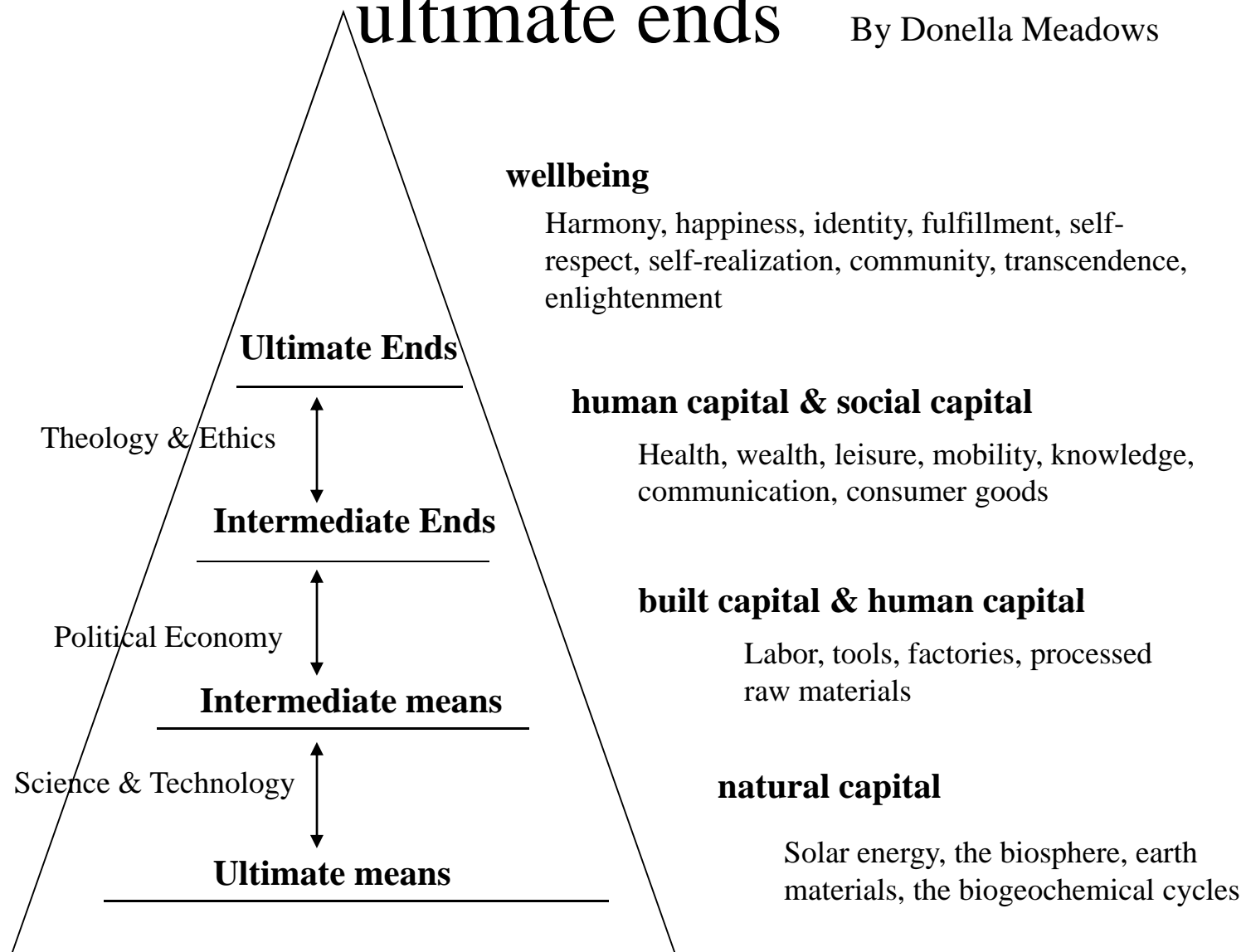
# What is Sustainability?

## **The Native American Iroquois Confederacy**

"seventh generation" philosophy mandating that chiefs always consider the effects of their actions on their descendants through the seventh generation in the future.

# Hierarchy from ultimate means to ultimate ends

By Donella Meadows



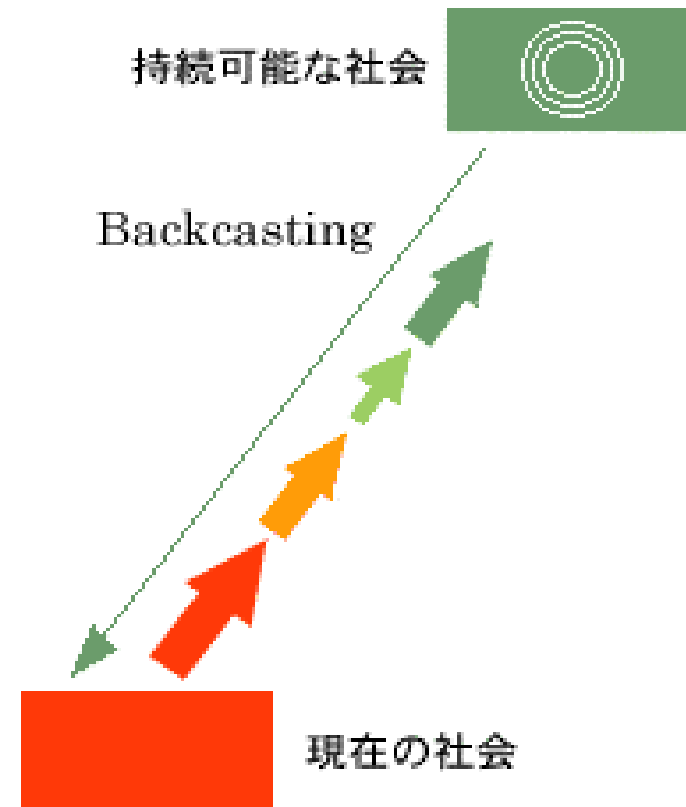
Source: <http://www.sustainabilityinstitute.org/pubs/Indicators&Information.pdf>

# Now what?

## Vision and Backcasting

フォアキャスティング手法

バックキャスティング手法



# Positive signs on climate change

“Across the world, commitments are forthcoming”

The new US administration is supporting strong American action.

China is setting ambitious targets for reducing energy intensity and making massive investments in renewable energy.

India has put forward its own action plan.

Europe has set a goal of cutting emissions by 30% below 1990 levels by 2020 if there is an ambitious global agreement.

Japan has published its proposals for major carbon reductions.



# Challenge

“A revolution that implies a huge shift in policy”

## Developed Countries:

- cut emissions by at least 80% relative to 1990 by 2050
- For U.S., it means cutting emissions to around one-tenth of today's per capita level

## Developing Countries:

- significantly slowing and peaking emissions growth in the coming decades
- For China, it means creating a new low-carbon model of economic development.

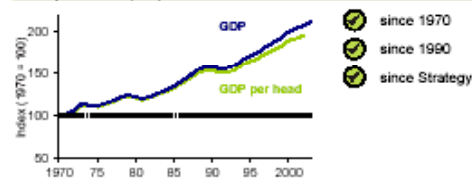
# Strategies for sustainability?

NO.	事例	国名	概要
1	持続可能な開発指標	イギリス	15のヘッドライン指標の最新データをグラフでわかりやすく示している
2	国家持続性戦略	ドイツ	「世代間の公平性」「生活の質」「社会的まとまり」の3分野で21の数値目標を設定
3	持続可能な開発指標	スウェーデン	「効率性」「貢献と平等」「適応性」「次の世代の価値と資源」の4テーマで30の指標を設定
4	持続可能な開発のモニタリングシステム	スイス	持続可能な開発に関する社会、経済、環境のデータベース。 ※ドイツ語、フランス語のみ
5	持続可能な開発指標	フィンランド	「世代間の公平性」「世界的責任」など8つのカテゴリーで64の指標を設定。毎年更新されている。
6	国家持続可能な開発戦略	デンマーク	主要な指標として、8つの基本原則のもと、14の指標を設定。その他、気候変動、生態系保全などの各分野で指標を設けている。
7	環境と持続可能な開発指標	カナダ	自然資本を中心とした6つの指標(大気環境、水環境、温室効果ガス、森林被覆、湿地、学業成績)を設定。
8	持続性指標	オーストラリア	持続可能な開発の国家戦略として、24の指標を設定。
9	国家持続可能な開発戦略	オーストリア	20の基本方針のもと、48の指標が定められている。※ドイツ語
10	持続可能な開発指標	アメリカ合衆国	社会、経済、環境にわけ、それぞれ「長期的な資源と負債」「経過」「現状の結果」の3種類で計39の指標を設定
11	持続可能な開発全国指標	フランス	※フランス語のみ

# UK headline indicators

## H1 ECONOMIC OUTPUT

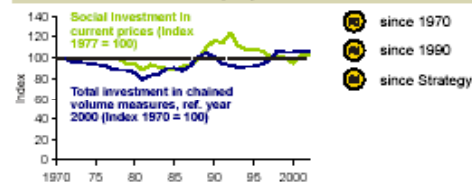
### GDP per head (UK)



- 27% increase in real GDP per head between 1990 and 2002 2.0% per year on average.
- Real GDP per head increased by 1.4% in 2002, and has increased by 9% since 1998.

## H2 INVESTMENT

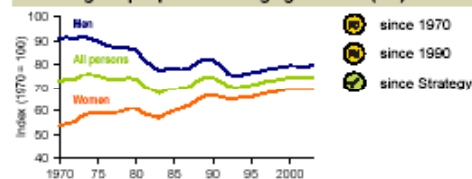
### Total & Social Investment (UK)



- Total real investment relative to GDP rose from 16.3% in 1990 to 17.2% in 1998, and was 17.2% in 2002.
- Social investment (railways, hospitals, schools etc.) was around 2% of GDP in 1990 and 1.7% in 2002 (only available on a current price basis).

## H3 EMPLOYMENT

### Percentage of people of working age in work (UK)



- The percentage of working age people in work was 74.7% in 2003 – the same as in 1990.
- The percentage for 2003 was 0.3 percentage points up on 2002 and was an increase on the 1999 figure of 73.9%.

## H4 POVERTY AND SOCIAL EXCLUSION

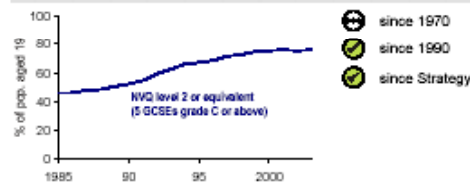
### Selected indicators of poverty & social exclusion



- 11.5% of working age people were in workless households in 2003, reduced from 12.8% in 1998; 14.8% were without qualifications, down from 16.7 in 1990.
- 28% of children were in relatively low-income households (after housing costs) in 2002-3, reduced from 34% in 1996-7.
- 28% of single elderly households experienced fuel poverty in 2001, reduced from 77% in 1991 and 61% in 1996.

## H5 EDUCATION

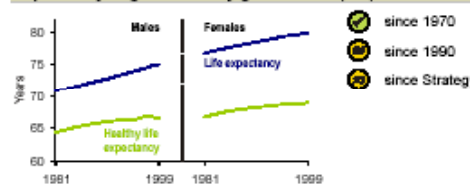
### Level 2 qualifications at age 19 (UK)



- In 2003, 76.1% of 19 year-olds achieved NVQ level 2 or equivalent (5 GCSEs grade C), up from 52% in 1990, and 74.5% in 1999. The 2003 figure was the same as that for 2001 (the previous highest level).

## H6 HEALTH

### Expectancy of good or fairly good health (GB)



- Between 1990 and 1999 healthy life expectancy increased only slightly, from 66.1 to 68.3 years for men and from 68.3 to 68.9 years for women.
- Overall life expectancy (75.1 years for men, 80.0 years for women) has increased more than healthy life expectancy, so an increasing proportion of those extra years are in poor health.

## H7 HOUSING CONDITIONS

### Households in non-decent housing (England)



- Between 1996 and 2001, non-decent housing fell from 52% to 38% and from 45% to 32% in the social and private sectors, respectively.
- Between 1991 and 1996 there was no significant change across a broad range of condition measures. As housing conditions have changed for the better since 1996, the overall assessment is that there has been an improvement since 1990.

## H8 CRIME

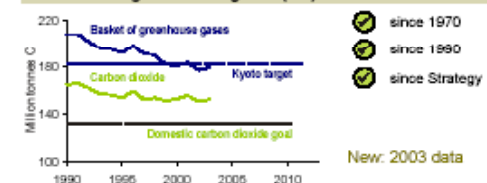
### Recorded crime (England & Wales)



- Both the British Crime Survey and recorded crime show that burglary and vehicle crimes fell substantially from the early 1990s: from 1990 such recorded crimes fell by 17% and 23% respectively (BCS indicates falls from 1991 of 29% and 38%).
- By 2002-3, recorded robbery had risen to 108,000 from 67,000 in 1998-9 but was 11% lower than the previous year.

## H9 CLIMATE CHANGE

### Emissions of greenhouse gases (UK)



- Emissions of the 'basket' of six greenhouse gases (on which progress is assessed) fell by 12% between 1990 and 2001, and provisionally by 14% between 1990 & 2003.
- CO<sub>2</sub> emissions for 2003 were provisionally 7% lower than in 1990 but rose by about 1.5% between 2002 and 2003.

## H10 AIR QUALITY

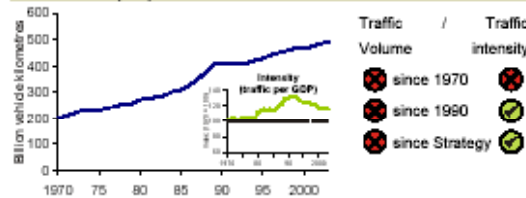
Days when pollution is moderate or higher (UK)



- Owing to an unusually hot summer 50 days in 2003 had moderate or higher air pollution on average at urban sites – down from 59 days in 1993 but up from 20 days in 2002.
- Rural air quality was relatively poor for 61 days in 2003 compared with 50 in 1990, but is highly dependent on the weather and there is no clear overall trend.

## H11 ROAD TRAFFIC

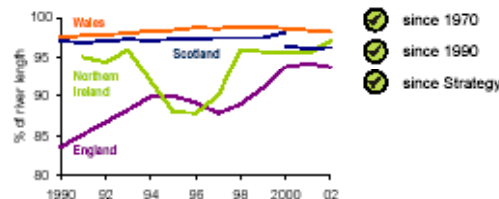
Road traffic (GB)



- Between 1990 and 2003, road traffic volume increased by 20% from 411 to (provisionally) 493 billion vehicle kilometres.
- Road traffic intensity (vehicle kilometres per GDP) fell by 11% between 1990 and 2003. This shows that, whilst traffic volumes have continued to rise, the historical link between road traffic and economic growth is weakening.

## H12 RIVER WATER QUALITY

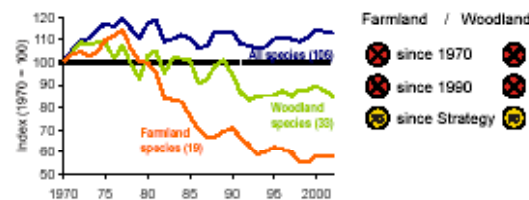
Rivers of good or fair chemical quality (UK)



- In 2002 94% of UK river lengths were of good or fair chemical quality. A similar proportion were of good or fair biological quality (not shown), with 68% of good quality.
- There have been significant improvements in English rivers for both chemical and biological quality.

## H13 WILDLIFE

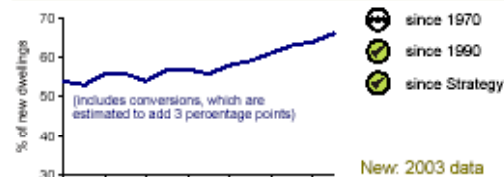
Populations of wild birds (UK)



- The index of farmland bird populations has nearly halved since its 1977 peak and has fallen by 18% since 1990, but has remained at about the same level over the last four years.
- The woodland bird index fell by 29% between its 1974 peak & 1998 since when it has remained roughly constant.

## H14 LAND USE

Homes built on previously developed land (England)



- In 2003, 66% of new dwellings were provided on previously developed land and through conversions, up from around 54% in the early 1990s.

## H15 WASTE

Household waste (England & Wales)



- Household waste is about a sixth of all controlled waste. Between 1991-2 and 2002-3, the amount not recycled or composted increased by 7% from 417 to 446 kg per person. However, the percentage recycled or composted increased from 3% to 14% in the same period and in 2002-3 the amount not recycled fell for the first time in recent years.
- In 1998-9 UK households, commerce and industry produced about 195 million tonnes of waste (not shown). About 50% of this went to landfill. Estimated figures for 2000-1 suggest the total amount of waste was 220 million tonnes, with 45% going to landfill. (These changes are not statistically significant.)

## Quality of Life Barometer

Updated June 2004



SUSTAINABLE DEVELOPMENT

Sustainable development is about ensuring a better quality of life for everyone, now and for generations to come.

The 15 Headline indicators of sustainable development – a quality of life barometer – provide an overview of progress in meeting the objectives of the UK Sustainable Development Strategy - *A better quality of life* (May 1999).

Headline indicators – assessment of progress

	since 1990	since Strategy
Economic output	⊗	⊗
Investment	⊗	⊗
Employment	⊗	⊗
Poverty & social exclusion	⊗	⊗
Education	⊗	⊗
Health	⊗	⊗
Housing - conditions	⊗	⊗
Crime - robbery	⊗	⊗
- vehicle & burglary	⊗	⊗
Climate change	⊗	⊗
Air quality	⊗	⊗
Road traffic - total traffic volumes	⊗	⊗
- traffic per GDP	⊗	⊗
River water quality	⊗	⊗
Wildlife - farmland birds	⊗	⊗
- woodland birds	⊗	⊗
Land use	⊗	⊗
Waste - household waste	⊗	⊗
- all arisings & management	⊗	⊗
Key:		
Significant change, in direction of meeting objective	⊗	⊗
No significant change	⊗	⊗
Significant change, in direction away from meeting objective	⊗	⊗
Insufficient or no comparable data	⊗	⊗

Where a trend is unacceptable, the government will adjust its policies, and look to others to join it in taking action. A full assessment of progress can be found in the fourth Government Annual Report on Sustainable Development 2003: *Achieving a better quality of life*. Data and further details on the Headline and a wider core set of indicators are available on the website below.

[www.sustainable-development.gov.uk](http://www.sustainable-development.gov.uk)

For additional copies of this leaflet, please call 020 7082 8621

# Germany

## Our Strategy for Sustainable Development

項目		指標	長期目標	1998-2003 の傾向
世代間の 公平性	1. 資源の保存	・エネルギー生産性 (GDP / kwh)	・2020年に1990年の2倍	↗
		・資源生産性 (GDP / 資源消費量 (トン))	・2020年に1994年の2倍	↗
	2. 温暖化防止	京都議定書の温室効果ガス	2008年比/2012年 (6ガス) 1990年比-21% 2005年 (CO2)	↗
	3. 再生可能エネルギー	一次エネルギー消費・電力消費に しめる再生可能エネルギーの割合	1990年比-25% 2010年に2000年の2倍 2050年にエネルギー消費の約半分	↗
	4. 土地消費面積	1日当たりの市街地・交通施設の 土地利用面積 (ha)	2020年に現在の129haから30haに。	↗
	5. 生物多様性	選択された種の量の中央値	持続可能な状態に達するまで多様性を 向上。 2015年に安定させる。	→
	6. 国・地方税政債務	財政債務総額 / GDP	国家予算の整理	↘
	7. 将来の経済的安定のための 対策	総投資率 / GDP	革新的なダイナミズムの増加	↘
	8. 研究開発	研究開発費 / GDP	2010年にGDPの3%まで増加	↗
9. 教育と訓練	25歳までで大学を出ていない人の 割合 新年度の大学に入学する人の 割合	高等学校卒業の割合を2010年までに 10%、2020年までに20%増加 高等教育の途中退学者の割合を2010 年に9.3%、2020年に4.6%。 大学の入学者を2010年に40%	→ → →	

# Germany Our Strategy for Sustainable Development

生活の質	10. 経済繁栄	GDP/人	経済成長	↗
	11. 輸送	トンキロ/GDP・人キロ/GDP	トンキロ/GDP 2020年に1999年比-20% 人キロ/GDP	↗
		貨物輸送に占める鉄道と内水輸送の割合	2020年に1999年比+5% 鉄道:2015年に25%に向上 船:2015年に14%に向上	→
	12. 食糧・栄養	窒素過多	2010年までに80kgN/haまで削減	→
		全体の農地に占めるエコロジー農地の割合	2010年に20%に向上	↗
	13. 大気汚染物質	CO <sub>2</sub> 、NO <sub>x</sub> 、アンモニア、VOC排出総量	2010年に1990年比-70%	↗
	14. 健康	65歳前に死亡する人の割合	減らす	↗
		健康への満足度	高いレベルで安定させる	↗
15. 犯罪	住居での泥棒件数	2010年に現状から10%削減(件数を117,000)	↗	
社会的まとめ	16. 雇用	有業率(15~65歳までの人口のうち有業者の割合)	2010年に70%に向上。	↗
	17. 家族の視点	フルタイムのデイケア施設の割合	各年代で30%	→
	18. 男女機会均等	男女の平均年収の違い	2015年に85%	↗
	19. 外国人との連携	高校を卒業していない外国人の割合	減らす	↗
国際的責任	20. 途上国協力	ODA総額/GDP	2006年に0.33%	↗
	21. 市場の開放	開発途上国からの輸入	増やす	↘

参照 : Perspectives for Germany Our Strategy for Sustainable Development Progress Report 2004

# How to measure and track Sustainability?

NO.	事例		
1	国際競争力ランキング	国際経営開発研究所 (IM D)	世界の60カ国の競争力ランキングを323の基準で毎年報告している。総合ランキングでは、日本は23位(2004年)。
2	NationMaster.com		世界各国の4000を超える統計データが見られる。図で国別比較もできる。
3	Environmental Sustainability Index (ESI)	コロンビア大学、エール大学	5つの構成要素で、21の指標を設定。
4	主要環境指標	経済協力開発機構 (OECD)	気候変動、オゾン層など10の指標
5	環境指標	国連環境計画・アジア太平洋地域事務所 (UNEP/ROAP)	北東アジア、中央アジアなど地域別に環境指標を設定した
6	The Wellbeing of Nation	国際自然連合 (IUCN)	180カ国の持続可能性をランキング
7	人間開発報告書	国連開発計画	人間開発指数(1人当たりのGDP、平均寿命、就学率から算出)を開発の度合いを測定する尺度として設定、毎年報告書を作成
8	持続可能な開発のための指標と情報システム	ドネラH.メドウズ	バラトングループへの報告として1998年に作成。持続可能性指標のフレームワークが提案されている。
9	Limits to Growth: The 30-Year Update	ドネラH.メドウズ	1972年に出された「成長の限界」の改訂版。
10	持続可能な開発指標	国連持続可能な開発委員会 (CSD)	経済、環境、社会、制度の4つのフレームで指標を設定

# Limits to Growth – The 30-Year Update

Key question:

Are current policies leading to a sustainable future or to collapse? What can be done to create a human economy that provides sufficiently for all?

⇒ Systems Thinking

⇒ Computer Modeling (exponential growth, feedback loops, sources & sinks, overshoot..)

⇒ 10 different scenarios

⇒ Asking for Choice

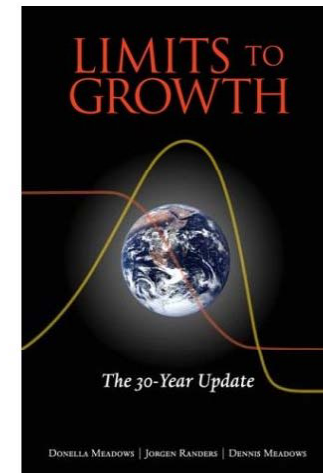


# “Limits to Growth – The 30-Year Update”

## Some quotations

*“We worry that current policies will produce global overshoot and collapse through ineffective efforts to anticipate and cope with ecological limits.”*

*“Ecological overshoot seems to us to be a much more important concept in the 21<sup>st</sup> century than free trade. But it is far behind in the fight for public attention and respect. This book is a new attempt to close that gap.”*



# Key points

1. 10 different pictures of how the 21<sup>st</sup> century may evolve
2. Purpose is to encourage learning, reflection, and personal choice.
3. Report will be updated in 2012 – there will be abundant data to test the reality
4. “You have to form your own opinion about causes and consequences of growth in the human ecological foot print.”

# World 3 Model – looking at dynamic systems

- ✓ Sets of interconnected material and immaterial elements that change overtime
  - ✓ Many elements of demography, economy, and the environment as one planetary system
    - Stocks and flows
    - feedback loops
    - sources & sinks
    - thresholds
    - Overshoot
- => See demo simulation soft “Stella”

# “Overshoot”

<daily examples>

hangover, driving on icy road, CFCs, stock market...

<Causes>

- Growth, acceleration, rapid change
- Limit, barrier
- Delay or mistake in the perceptions and the responses that strive to keep the systems within its limits

<Results>

- Crash of some kind
- Deliberate turnaround, correction, careful easing down

# World 3 Model - Lesson

- When do we start observing the effect of “overshoot”?

⇒ First decade of the 21<sup>st</sup> century will still be a period of growth.

⇒ It will take another decade before the consequences of overshoot are clearly observable and two decades before the overshoot is generally acknowledged.

# Lessons from World3

## ✓ Change the “structure”

- Change feedback structure/information links in the system
- Change the content and timeliness of the data that actors in the system have to work with
- Change the ideas, goals, incentives, costs, and feedbacks that motivates or constrain behavior
- In time, system with a new information structure is likely to change its social and physical structures.
- It may develop new laws, organizations, technologies, people with new skills, machines and buildings.
- Such a transformation need not be directed centrally; it can be unplanned, natural, evolutionary, exciting, joyful.

# The Environmental Sustainability Index (ESI)

- World Economic Forum, The Yale Center for Environmental Law and Policy, and the Columbia University
- a measure of overall progress towards environmental sustainability.
- 5 components
- Permits cross-national comparisons of environmental progress in a systematic and quantitative fashion.
- Published in 2002, updated in 2005.

## *The ESI in action...*

*“As a conceptual framework and analytic tool, the Environmental Sustainability Index has now been introduced to the policymaking discourse in the Philippines. As Chair of the Committee on Ecology in the House of Representatives, I have called on the government to be more serious about measuring the efficacy of programs and policies -- and the ESI provides a way to benchmark our performance and identify successful strategies.”*

*Neric Acosta  
Congressman and Chair of the Committee on Ecology  
Manila, The Philippines*

# How Sustainable is Japan?

## 5 components

- Environmental Systems                      32/100      NEGATIVE
  - Air Quality/water/biodiversity/land
- Reducing Environmental Stresses      37/100      Mixed
  - Reducing air pollution/water stress/ecosystem stress...
- Reducing Human Vulnerability      64/100      Mixed
  - Basic human sustenance/environmental health
- Social and Institutional Capacity      89/100      POSITIVE
  - Env. Governance/Eco Efficiency/ Private Sec.  
Responsiveness/Science&Tech
- Global Stewardship                      78/100      POSITIVE
  - Participation in int'l cooperative efforts/reducing greenhouse gas  
emissions/transboundary environmental pressures



## Environmental Sustainability Index – Rankings and Scores

ESI Rank	CountryName	ESI Score	OECD Rank	Non-OECD Rank	ESI Rank	CountryName	ESI Score	OECD Rank	Non-OECD Rank	ESI Rank	CountryName	ESI Score	OECD Rank	Non-OECD Rank
1	Finland	75.1	1		50	Cameroon	52.5		32	99	Azerbaijan	45.4		73
2	Norway	73.4	2		51	Ecuador	52.4		33	100	Kenya	45.3		74
3	Uruguay	71.8		1	52	Laos	52.4		34	101	India	45.2		75
4	Sweden	71.7	3		53	Cuba	52.3		35	102	Poland	45.0	27	
5	Iceland	70.8	4		54	Hungary	52.0	19		103	Niger	45.0		76
6	Canada	64.4	5		55	Tunisia	51.8		36	104	Chad	45.0		77
7	Switzerland	63.7	6		56	Georgia	51.5		37	105	Morocco	44.8		78
8	Guyana	62.9		2	57	Uganda	51.3		38	106	Rwanda	44.8		79
9	Argentina	62.7		3	58	Moldova	51.2		39	107	Mozambique	44.8		80
10	Austria	62.7	7		59	Senegal	51.1		40	108	Ukraine	44.7		81
11	Brazil	62.2		4	60	Zambia	51.1		41	109	Jamaica	44.7		82
12	Gabon	61.7		5	61	Bosnia & Herze.	51.0		42	110	United Arab Em.	44.6		83
13	Australia	61.0	8		62	Israel	50.9		43	111	Togo	44.5		84
14	New Zealand	60.9	9		63	Tanzania	50.3		44	112	Belgium	44.4	28	
15	Latvia	60.4		6	64	Madagascar	50.2		45	113	Dem. Rep. Congo	44.1		85
16	Peru	60.4		7	65	United Kingdom	50.2	20		114	Bangladesh	44.1		86
17	Paraguay	59.7		8	66	Nicaragua	50.2		46	115	Egypt	44.0		87
18	Costa Rica	59.6		9	67	Greece	50.1	21		116	Guatemala	44.0		88
19	Croatia	59.5		10	68	Cambodia	50.1		47	117	Syria	43.8		89
20	Bolivia	59.5		11	69	Italy	50.1	22		118	El Salvador	43.8		90
21	Ireland	59.2	10		70	Bulgaria	50.0		48	119	Dominican Rep.	43.7		91
22	Lithuania	58.9		12	71	Mongolia	50.0		49	120	Sierra Leone	43.4		92
23	Colombia	58.9		13	72	Gambia	50.0		50	121	Liberia	43.4		93
24	Albania	58.8		14	73	Thailand	49.7		51	122	South Korea	43.0	29	
25	Central Afr. Rep.	58.7		15	74	Malawi	49.3		52	123	Angola	42.9		94
26	Denmark	58.2	11		75	Indonesia	48.8		53	124	Mauritania	42.6		95
27	Estonia	58.2		16	76	Spain	48.8	23		125	Philippines	42.3		96
28	Panama	57.7		17	77	Guinea-Bissau	48.6		54	126	Libya	42.3		97
29	Slovenia	57.5		18	78	Kazakhstan	48.6		55	127	Viet Nam	42.3		98
30	Japan	57.3	12		79	Sri Lanka	48.5		56	128	Zimbabwe	41.2		99
31	Germany	56.9	13		80	Kyrgyzstan	48.4		57	129	Lebanon	40.5		100
32	Namibia	56.7		19	81	Guinea	48.1		58	130	Burundi	40.0		101
33	Russia	56.1		20	82	Venezuela	48.1		59	131	Pakistan	39.9		102
34	Botswana	55.9		21	83	Oman	47.9		60	132	Iran	39.8		103
35	P. N. Guinea	55.2		22	84	Jordan	47.8		61	133	China	38.6		104
36	France	55.2	14		85	Nepal	47.7		62	134	Tajikistan	38.6		105
37	Portugal	54.2	15		86	Benin	47.5		63	135	Ethiopia	37.9		106
38	Malaysia	54.0		23	87	Honduras	47.4		64	136	Saudi Arabia	37.8		107
39	Congo	53.8		24	88	Côte d'Ivoire	47.3		65	137	Yemen	37.3		108
40	Netherlands	53.7	16		89	Serbia & Mont.	47.3		66	138	Kuwait	36.6		109
41	Mali	53.7		25	90	Macedonia	47.2		67	139	Trinidad & Tob.	36.3		110
42	Chile	53.6		26	91	Turkey	46.6	24		140	Sudan	35.9		111
43	Bhutan	53.5		27	92	Czech Rep.	46.6	25		141	Haiti	34.8		112
44	Armenia	53.2		28	93	South Africa	46.2		68	142	Uzbekistan	34.4		113
45	United States	52.9	17		94	Romania	46.2		69	143	Iraq	33.6		114
46	Myanmar	52.8		29	95	Mexico	46.2	26		144	Turkmenistan	33.1		115
47	Belarus	52.8		30	96	Algeria	46.0		70	145	Taiwan	32.7		116
48	Slovakia	52.8	18		97	Burkina Faso	45.7		71	146	North Korea	29.2		117
49	Ghana	52.8		31	98	Nigeria	45.4		72					

Note: The 2005 ESI scores are not directly comparable to the 2002 ESI scores. See Appendix A for details on methodological changes.

The 2005 Environmental Sustainability Index (ESI) benchmarks the ability of nations to protect the environment over the next several decades. It does so by integrating 76 data sets – tracking natural resource endowments, past and present pollution levels, environmental management efforts, and a society's capacity to improve its environmental performance – into 21 indicators of environmental sustainability.

These indicators permit comparison across the following five fundamental components of sustainability: Environmental Systems; Environmental Stresses; Human Vulnerability to Environmental Stresses; Societal Capacity to Respond to Environmental Challenges; and Global Stewardship.

The issues reflected in the indicators and the underlying variables were chosen through an extensive review of the environmental literature, assessment of available data, rigorous analysis, and broad-based consultation with policymakers, scientists, and indicator experts.

The ESI provides a powerful environmental decisionmaking tool tracking national environmental performance and facilitating

comparative policy analysis. It enables a more data-driven and empirical approach to policymaking.

While absolute measures of sustainability remain elusive, many aspects of environmental sustainability can be measured on a relative basis with results that provide a context for policy evaluations and judgments. Such comparisons are especially important in the new context of worldwide efforts to advance the environment-related aspects of the Millennium Development Goals.

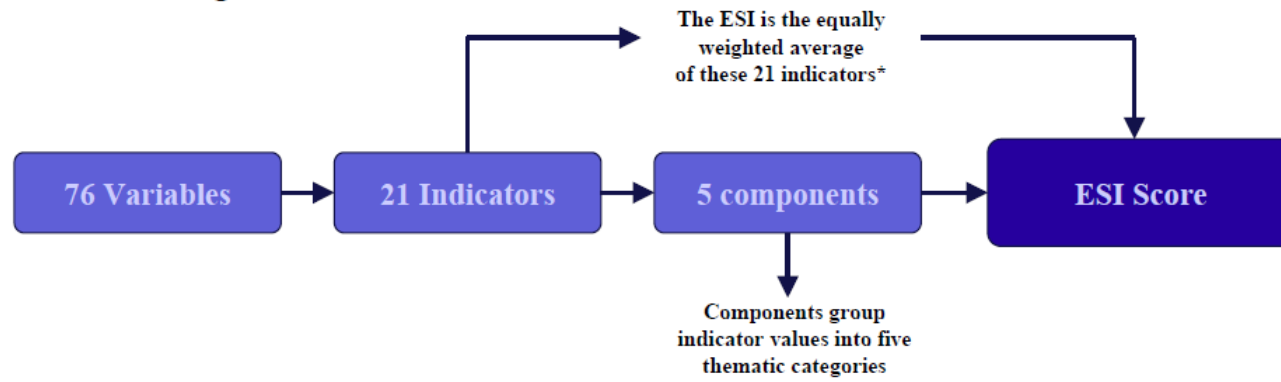
Higher ESI scores suggest better environmental stewardship. The five highest-ranking countries are Finland, Norway, Uruguay, Sweden, and Iceland – all countries that have substantial natural resource endowments, low population density, and have managed the challenges of development with some success.

The lowest ranking countries are North Korea, Iraq, Taiwan, Turkmenistan, and Uzbekistan. These countries face numerous issues, both natural and manmade, and have not managed their policy choices well.

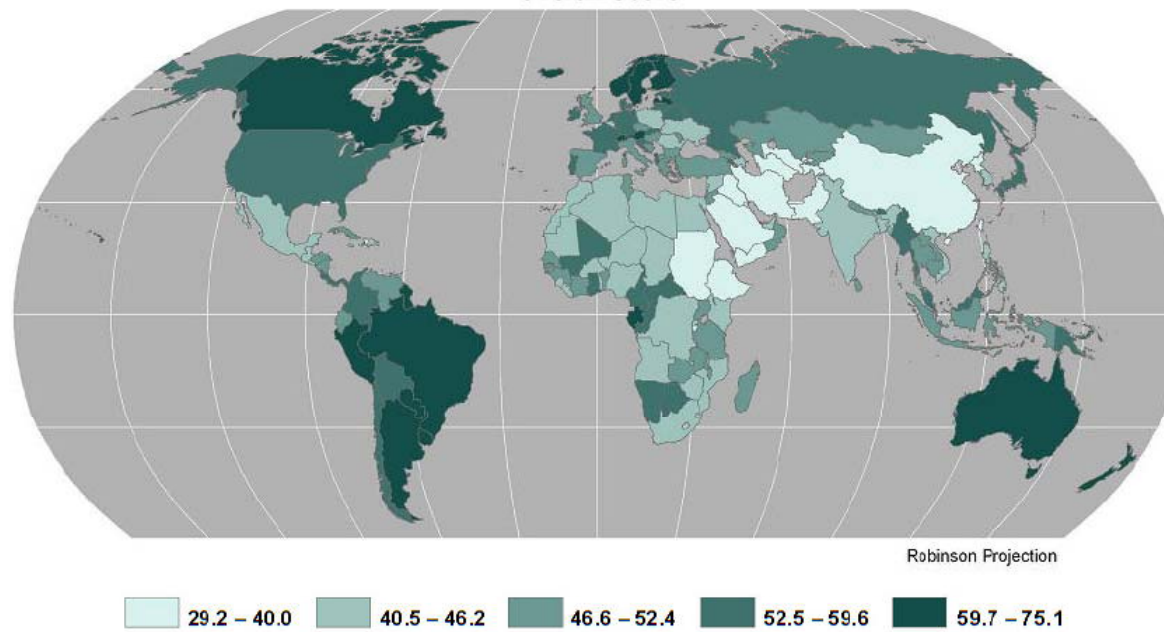
A number of core policy conclusions emerge from the ESI analysis:

- The ESI provides a valuable tool for benchmarking environmental stewardship and permits comparative policy analysis.
- Environmental stewardship demands attention to a wide range of pollution control and natural resource management issues.
- Developing and developed countries face distinct environmental challenges – the pollution pressures of industrialization on one hand and the stresses of poverty and incapacity on the other.
- Economic success contributes to the potential of environmental success but does not guarantee it. Environmental stewardship depends on both policy efforts and a society's over-arching social, political, and economic systems.
- While it appears that no country is on a fully sustainable trajectory, at every level of development, some countries are managing their environmental challenges better than others.
- Measures of governance, including the rigor of regulation and the degree of cooperation with international policy efforts, correlate highly with overall environmental success. This result suggests that emphasis on good governance may be justified.
- The lack of reliable data to measure performance on a number of issues and across many countries hinders attempts to move toward more data-driven and empirical decisionmaking.

## Constructing the ESI



## Environmental Sustainability Index Country Scores by Quintile



\*Note: While the equal weighting of the indicators has some affect on ESI Scores, sensitivity analysis demonstrates the relative robustness of the ESI structure.

# 1<sup>st</sup> lecture -- Lessons

## 1) What is Sustainability?

- Variety of definitions
- Conditions + Values (participation, equity, wellbeing, etc.)

## 2) How are countries responding?

- Climate change targets
- National strategies and indicators

## 3) How to measure and track it?

- Models / index