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Sustainable Development and International Development Cooperation
No. 4

1. Concept and Theory of Sustainable Development

Sustainable Development: Ecosystem and Social/ Human system

Inter-generational equity, Intra-generational equity

Sustainability: Ecological carrying capacity, MSY, MEY

ICCAT: International Commission for the Conservation of Atlantic Tunas

1966: International Convention for the Conservation of Atlantic Tunas

1969 Enact , Member countries: 48

TAC: Total Allowable Catch

Black Tuna

2008：28,500t, 2009：22,000t, 2010: 19,950t (13,500t), 2011：18,500t

ATLANTIC YELLOWFIN TUNA SUMMARY

Maximum Sustainable Yield (MSY)	~130,600 t [1] (124,100-136,500)
	~146,600 t [2] (128,200-152,500)
2006 Yield [3]	108,160 t
Current Yield [3] (2008)	107,859 t
Replacement Yield (2006)	~ 130,000 t
Relative Biomass B_{2006}/B_{MSY} [4]	0.96 (0.72-1.22)
Relative Fishing Mortality: $F_{current}/F_{MSY}$ [4]	0.86 (0.71-1.05)
$F_{current}/F_{0.1}$ [5]	1.26 (1.11-1.44)
$F_{current}/F_{20\%SPR}$ [5]	0.81 (0.73-0.93)
$F_{current}/F_{30\%SPR}$ [5]	1.12 (1.01-1.29)
$F_{current}/F_{40\%SPR}$ [5]	1.52 (1.35-1.73)

Management measures in effect:
- − Effective fishing effort not to exceed 1992 level [Rec. 93-04].
- − Rec. 04-01, effective 2005. Season/area closure. Although this measure was intended to reduce the catches of juvenile bigeye tuna, as this is a complete closure, impacts are expected on all tropical tunas.
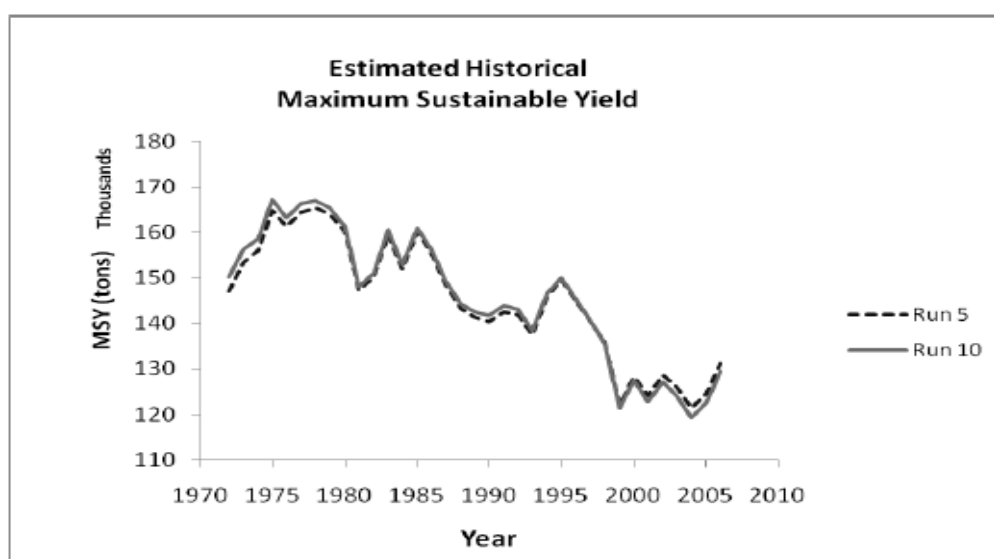
NOTE $F_{current}$ refers to F_{2006} in the case of ASPIC, and the geometric mean of F across 2003-2006 in the case of VPA. As a result of the constant trend in recruitment estimated by the VPA model, F_{MAX} is used as a proxy for F_{MSY} for VPA results.

[1] Estimates (with 80% confidence limits) based upon results of the age-structured model (VPA).
[2] Estimates (with 80% confidence limits) based upon results of the non-equilibrium production model (ASPIC).
[3] The assessment was conducted using the available catch data through 2006. Subsequent revisions have reduced reported catch levels slightly to 107,859 t. [4] Median (25th-75th percentiles) from joint distribution of age-structured and production model bootstrap outcomes considered.
[5] Result exclusively from VPA and yield-per-recruit analyses.

Estimated Historical Maximum Sustainable Yield

- - - - Run 5
—— Run 10

YFT-Figure 9. Estimates of historical MSY values for Atlantic yellowfin obtained through the age-structured model analysis, which considers the changes in selectivity that have occurred.

Source: ICCAT Report 2008-2009(Ⅱ)

2. SD Indicators

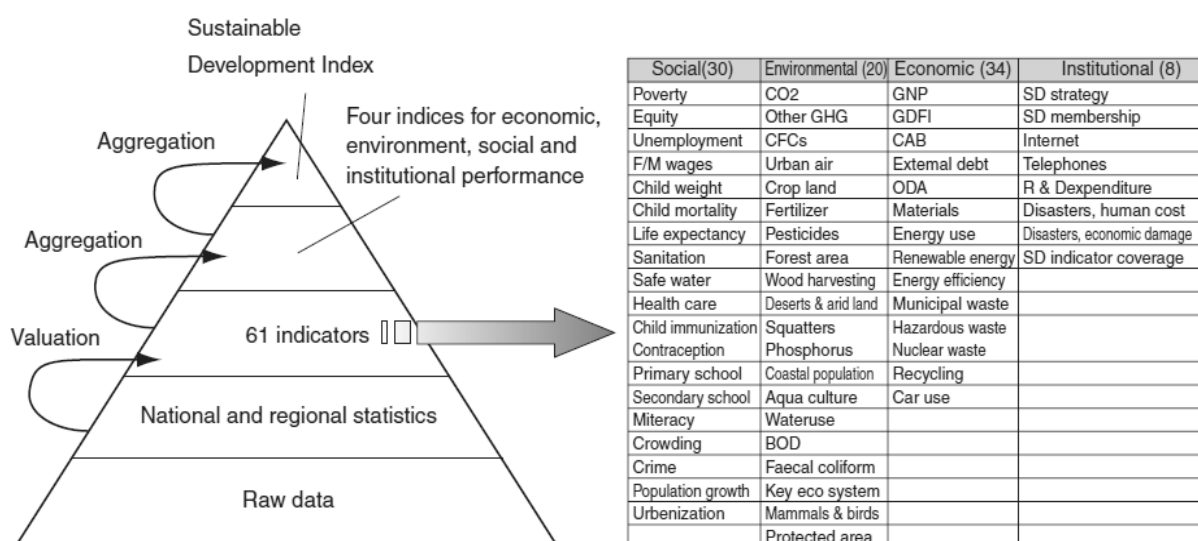Three Pillars or 3Bottom Lines: Environmental Sustainability

Social Sustainability

Economic Sustainability
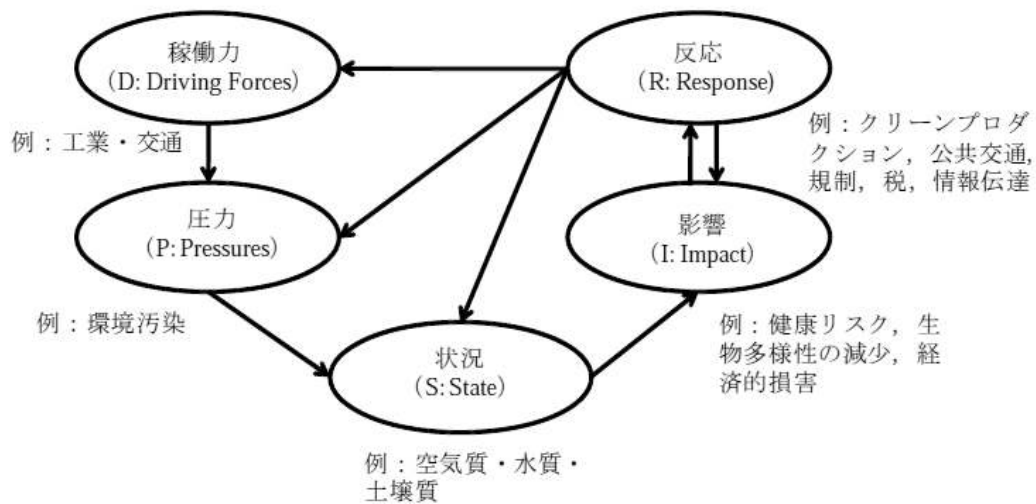
(Institutional Sustainability, Cultural Sustainability)

Indicators of SD → main factors (variables) of SD

Figure 7 Aggregation between Environmental Indicators and Social Indicators (IISD-Dashhboad)

Sustainable Development Index

Four indices for economic, environment, social and institutional performance

Aggregation

Aggregation

Valuation

61 indicators

National and regional statistics

Raw data

Social(30)	Environmental (20)	Economic (34)	Institutional (8)
Poverty	CO2	GNP	SD strategy
Equity	Other GHG	GDFI	SD membership
Unemployment	CFCs	CAB	Internet
F/M wages	Urban air	External debt	Telephones
Child weight	Crop land	ODA	R & Dexpenditure
Child mortality	Fertilizer	Materials	Disasters, human cost
Life expectancy	Pesticides	Energy use	Disasters, economic damage
Sanitation	Forest area	Renewable energy	SD indicator coverage
Safe water	Wood harvesting	Energy efficiency	
Health care	Deserts & arid land	Municipal waste	
Child immunization	Squatters	Hazardous waste	
Contraception	Phosphorus	Nuclear waste	
Primary school	Coastal population	Recycling	
Secondary school	Aqua culture	Car use	
Miteracy	Wateruse		
Crowding	BOD		
Crime	Faecal coliform		
Population growth	Key eco system		
Urbenization	Mammals & birds		
	Protected area		

Source: IISD website

DPSIR (OECD)

例：工業・交通

例：環境汚染

例：クリーンプロダクション，公共交通，規制，税，情報伝達

例：健康リスク，生物多様性の減少，経済的損害

例：空気質・水質・土壌質

稼働力
(D: Driving Forces)

反応
(R: Response)

圧力
(P: Pressures)

影響
(I: Impact)

状況
(S: State)

（出所）LEAD (Livestock, Environment and Development) Initiative. (1999) より筆者修正

図1．DPSIRフレームワーク

UN-CSD

Phase 1: 1995-1996; Development of Indicator Methodology Sheets; Agenda 21, DSR

Phase 2: 1996-1998; Training and capacity building (UNDP Capacity 21),

National testing （22 countries）

Phase 3: 1998-2000; Lessons learned, Evaluation of testing results and indicator set

Table 2: DSR Framework for Sustainable Development Indicators

SD Dimension	Chapter of Agenda 21	Driving Force Indicators	State Indicators	Response Indicators
Social				
Economic				
Environmental				
Institutional				

Table 4: CSD Theme Indicator Framework

SOCIAL		
Theme	**Sub-theme**	**Indicator**
Equity	Poverty (3)	Percent of Population Living below Poverty Line
		Gini Index of Income Inequality
		Unemployment Rate
	Gender Equality (24)	Ratio of Average Female Wage to Male Wage
Health (6)	Nutritional Status	Nutritional Status of Children
	Mortality	Mortality Rate Under 5 Years Old
		Life Expectancy at Birth
	Sanitation	Percent of Population with Adequate Sewage Disposal Facilities
	Drinking Water	Population with Access to Safe Drinking Water
	Healthcare Delivery	Percent of Population with Access to Primary Health Care Facilities
		Immunization Against Infectious Childhood Diseases
		Contraceptive Prevalence Rate
Education (36)	Education Level	Children Reaching Grade 5 of Primary Education
		Adult Secondary Education Achievement Level
	Literacy	Adult Literacy Rate
Housing (7)	Living Conditions	Floor Area per Person
Security	Crime (36, 24)	Number of Recorded Crimes per 100,000 Population
Population (5)	Population Change	Population Growth Rate
		Population of Urban Formal and Informal Settlements
ENVIRONMENTAL		
Theme	**Sub-theme**	**Indicator**
Atmosphere (9)	Climate Change	Emissions of Greenhouse Gases
	Ozone Layer Depletion	Consumption of Ozone Depleting Substances
	Air Quality	Ambient Concentration of Air Pollutants in Urban Areas
Land (10)	Agriculture (14)	Arable and Permanent Crop Land Area
		Use of Fertilizers
		Use of Agricultural Pesticides
	Forests (11)	Forest Area as a Percent of Land Area
		Wood Harvesting Intensity
	Desertification (12)	Land Affected by Desertification
	Urbanization (7)	Area of Urban Formal and Informal Settlements
Oceans, Seas and Coasts (17)	Coastal Zone	Algae Concentration in Coastal Waters
		Percent of Total Population Living in Coastal Areas
	Fisheries	Annual Catch by Major Species
Fresh Water (18)	Water Quantity	Annual Withdrawal of Ground and Surface Water as a Percent of Total Available Water
	Water Quality	BOD in Water Bodies
		Concentration of Faecal Coliform in Freshwater
Biodiversity (15)	Ecosystem	Area of Selected Key Ecosystems
		Protected Area as a % of Total Area
	Species	Abundance of Selected Key Species

International Goals, Targets, and Standards Related to Themes and Sub-Themes of Indicators of Sustainable Development

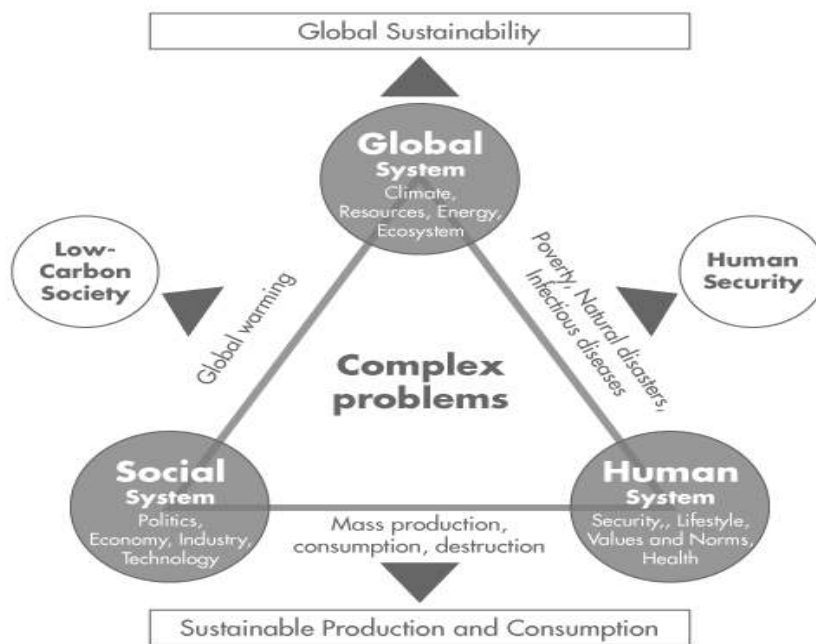| SOCIAL		
Theme	**Sub-theme**	**Goals, Targets, and Standards**
Equity	Poverty	i) Reduce proportion of people living in extreme poverty in developing countries by at least one-half by 2015 compared to 1990 *(Copenhagen95)*. ii) Universal access to paid employment *(Copenhagen95)*.
	Gender Equality	Eliminate discriminatory practices in employment *(Beijing)*
Health	Nutrition Status	Reduce severe and moderate malnutrition among under 5 year old children by 50% from 1990 to 2000 *(New York90, Copenhagen95, Beijing95, Rome96,*
	Mortality	Reduce mortality rate for children under 5 years old by two-thirds of 1990 levels by 2015 *(Cairo94, New York90)*
	Sanitation	Universal access to sanitary waste disposal *(Rio de Janeiro92, Copenhagen95, Beijing95)*
	Drinking Water	Universal access to safe drinking water supply by 2025 *(Rio de Janeiro92, Copenhagen95, Beijing95)*
	Healthcare Delivery	i) Universal access to primary health care and reproductive health services by 2015 *Cairo94, Copenhagen95, Beijing95)* ii) Universal immunization against measles *(New York90,)* iii) Universal access to safe and reliable contraceptive methods *(Cairo94)*
Education	Education Level	Universal access, and completion of primary education by 2015 *(Jomtien90, Cairo94, Beijing95)*
	Literacy	Adult literacy reduced by half of the 1990 level by 2000 *(Jomtien90, Copenhagen95, Beijing95)*
Housing	Living Conditions	Provision of sufficient living space and avoidance of overcrowding *(Habitat II)*
Security	Crime	Significantly reduce violence and crime *(Cairo95)*
Population	Population Change	Stabilize world population *(Cairo94)*
ENVIRONMENTAL		
Theme	**Sub-theme**	**Goals, Targets, and Standards**
Atmosphere	Climate Change	i) Reduce overall developed country emissions of CO_2 equivalents by 5% of 1990 levels by 2008-2012 *(Kyoto97)* ii) Stabilize GHG concentrations in the atmosphere at a level that prevents dangerous anthropogenic interference with the climate system *(FCCC)*
	Ozone Layer Depletion	ODS consumption elimination schedule: halons by 1994; CFC, carbon tetrachloride, HBFC, and methyl chloroform by 1996; methyl bromide by 2010; and HCFC by 2030 *(Montreal Protocol and Amendments and Adjustments)*
	Air Quality	National air quality standards based on WHO air quality guidelines

ECONOMIC		
Theme	**Sub-theme**	**Indicator**
Economic Structure (2)	Economic Performance	GDP per Capita
		Investment Share in GDP
	Trade	Balance of Trade in Goods and Services
	Financial Status (33)	Debt to GNP Ratio
		Total ODA Given or Received as a Percent of GNP
Consumption and Production Patterns (4)	Material Consumption	Intensity of Material Use
	Energy Use	Annual Energy Consumption per Capita
		Share of Consumption of Renewable Energy Resources
		Intensity of Energy Use
	Waste Generation and Management (19-22)	Generation of Industrial and Municipal Solid Waste
		Generation of Hazardous Waste
		Generation of Radioactive Waste
		Waste Recycling and Reuse
	Transportation	Distance Traveled per Capita by Mode of Transport
INSTITUTIONAL		
Theme	**Sub-theme**	**Indicator**
Institutional Framework (38, 39)	Strategic Implementation of SD (8)	National Sustainable Development Strategy
	International Cooperation	Implementation of Ratified Global Agreements
Institutional Capacity (37)	Information Access (40)	Number of Internet Subscribers per 1000 Inhabitants
	Communication Infrastructure (40)	Main Telephone Lines per 1000 Inhabitants
	Science and Technology (35)	Expenditure on Research and Development as a Percent of GDP
	Disaster Preparedness and Response	Economic and Human Loss Due to Natural Disasters

ENVIRONMENTAL (continued)		
Theme	**Sub-theme**	**Goals, Targets, and Standards**
Land	Agriculture	Reduce the number of undernourished people to half their present level no later than 2015 *(Rome96)*
	Forests	i) All tropical timber products traded internationally shall originate from sustainably managed forest by 2000 *(International Tropical Timber Organization)* ii) National targets set under the sustained yield principle
	Desertification	
	Urbanization	
Oceans, Seas and Coasts	Coastal Zone	
	Fisheries	
Fresh Water	Water Quantity	Withdrawal limits may apply to specific international treaties between countries
	Water Quality	National water quality standards based on WHO guidelines for drinking water quality
Biodiversity	Ecosystem	10% protected area for each major ecosystem type by 2000 *(Caracas92)*
	Species	
ECONOMIC		
Theme	**Sub-theme**	**Goals, Targets, and Standards**
Economic Structure	Economic Performance	
	Trade	
	Financial Status	Total ODA from developed countries should be at least 0.7% of GNP *(United Nations)*
Consumption and Production Patterns	Material Consumption	
	Energy Use	
	Waste Generation and Management	i) National targets may apply for solid waste reduction and recycling ii) Prevent and minimize the generation of hazardous wastes *(Agenda 21)* iii) IAEA safety standards for the management of radioactive wastes
	Transportation	
INSTITUTIONAL		
Theme	**Sub-theme**	**Goals, Targets, and Standards**
Institutional Framework	Strategic Implementation of SD	National sustainable development strategies that reflect all interests formulated by all countries by 2002 *(United Nations General Assembly97)*
	International Coop.	
Institutional Capacity	Information Access	
	Communications Infrastructure	
	Science and Technology	One researcher engaged in R&D per 1000 population [for Africa] *(UNESCO95)*
	Disaster Preparedness and Response	Improve the capacity of each country to mitigate the effects of natural disasters expeditiously and effectively *(United Nations General Assembly89)*

Core Indicators and the Driving Force-State-Response Framework

SOCIAL					
Theme	**Sub-theme**	**Indicator**	**DF**	**S**	**R**
Equity	Poverty	Percent of Population Living below the Poverty Line		X	
		Gini Index of Income Inequality		X	
		Unemployment Rate	X		
	Gender Equality	Ratio of Average Female Wage to Male Wage		X	
Health	Nutrition Status	Nutritional Status of Children		X	
	Mortality	Mortality Rate Under 5 Years Old		X	
		Life Expectancy at Birth		X	
	Sanitation	Percent of Population with Adequate Sewage Disposal Facilities		X	
	Drinking Water	Population with Access to Safe Drinking Water		X	
	Healthcare Delivery	Percent of Population with Access to Primary Health Care Facilities			X
		Immunization Against Infectious Childhood Diseases			X
		Contraceptive Prevalence Rate			X
Education	Education Level	Children Reaching Grade 5 of Primary Education	X		
		Adult Secondary Education Achievement Level	X		
	Literacy	Adult Literacy Rate	X		
Housing	Living Conditions	Floor Area per Person		X	
Security	Crime	Number of Recorded Crimes per 100,000 Population		X	
Population	Population Change	Population Growth Rate	X		
		Population of Urban Formal and Informal Settlements		X	
ENVIRONMENTAL					
Theme	**Sub-theme**	**Indicator**	**DF**	**S**	**R**
Atmosphere	Climate Change	Emissions of Greenhouse Gases	X		
	Ozone Layer Depletion	Consumption of Ozone Depleting Substances	X		
	Air Quality	Ambient Concentration of Air Pollutants in Urban Areas		X	
Land	Agriculture	Arable and Permanent Crop Land Area		X	
		Use of Fertilizers	X		
		Use of Agricultural Pesticides	X		
	Forests	Forest Area as a Percent of Land Area		X	
		Wood Harvesting Intensity	X		
	Desertification	Land Affected by Desertification		X	
	Urbanization	Area of Urban Formal and Informal Settlements		X	
Oceans, Seas and Coasts	Coastal Zone	Algae Concentration in Coastal Waters		X	
		Percent of Total Population Living in Coastal Areas	X		
	Fisheries	Annual Catch by Major Species	X		

ENVIRONMENTAL					
Theme	Sub-theme	Indicator	DF	S	R
Fresh Water	Water Quantity	Annual Withdrawal of Ground and Surface Water as a Percent of Total Available Water	X		
	Water Quality	BOD in Water Bodies		X	
		Concentration of Faecal Coliform in Freshwater		X	
Biodiversity	Ecosystem	Area of Selected Key Ecosystems		X	
		Protected Area as a Percent of Total Area			X
	Species	Abundance of Selected Key Species		X	

ECONOMIC					
Theme	Sub-theme	Indicator	DF	S	R
Economic Structure	Economic Performance	GDP per Capita	X		
		Investment Share in GDP	X		
	Trade	Balance of Trade in Goods and Services		X	
	Financial Status	Debt to GNP Ratio		X	
		Total ODA Given or Received as a Percent of GNP	X		
Consumption and Production Patterns	Material Consumption	Intensity of Material Use		X	
	Energy Use	Annual Energy Consumption per Capita	X		
		Share of Consumption of Renewable Energy Resources		X	
		Intensity of Energy use		X	
	Waste Generation and Management	Generation of Industrial and Municipal Solid Waste	X		
		Generation of Hazardous Waste	X		
		Generation of Radioactive Waste	X		
		Waste Recycling and Reuse			X
	Transportation	Distance Traveled per Capita by Mode of Transport		X	

INSTITUTIONAL					
Theme	Sub-theme	Indicator	DF	S	R
Institutional Framework	Strategic Implementation of SD	National Sustainable Development Strategy			X
	International Cooperation	Implementation of Ratified Global Agreements			X
Institutional Capacity	Information Access	Number of Internet Subscribers per 1000 Population		X	
	Communication Infrastructure	Main Telephone Lines per 1000 Population		X	
	Science and Technology	Expenditure on Research and Development as a % of GDP			X
	Disaster Preparedness and Response	Economic and Human Loss Due to Natural Disasters	X		

Global Sustainability

Global System
Climate, Resources, Energy, Ecosystem

Low-Carbon Society

Human Security

Global warming

Poverty, Natural disasters, Infectious diseases

Complex problems

Social System
Politics, Economy, Industry, Technology

Human System
Security, Lifestyle, Values and Norms, Health

Mass production, consumption, destruction

Sustainable Production and Consumption

6. References

Sustainability

World Commission on Environment and Development (1987), *Our Common Future*, Oxford UP

Bell, S. and Morse, S. (2008), *Sustainability Indicators*, Earthscan

7. Schedule of Course Work

1. Introduction   9/27

Part 1: History, Concept, and Theory of Sustainable Development (SD)

2. History and concept of SD   10/6

3. Theory of SD: Carrying Capacity and MSY   10/13

4. Measuring and Indicators of SD   10/20

5. * Students make a short report and presentation about your definition and measuring of SD 10/27

Part 2: Development and Environment in Developing Countries

6. Development issues: Poverty Trap and big push 11/10

7. Economy and society of developing countries: Dual society and two sector development model 11/17

8. Development strategy: import substitution and export oriented 11/24

9. Development strategy and environment 12/1

10. * Students make a short report and presentation about development issues in selected countries. 12/8

Part 3: Theory and Practice of International Cooperation

11. History and theory of international development cooperation 12/15

12. PRSP, MDGs, and Paris Declaration 12/22

13. Assessing Aid and environment 1/12

14. * Students make a short report and presentation about aid and development in selected cases. 1/19

Part 4: Toward a Sustainable Global Society (governance)

15. Sustainable global society, global governance and concluding remarks 1/26