

DEVELOPMENT OF A NATIONAL SET OF ENVIRONMENTAL PERFORMANCE INDICATORS FOR TURKEY

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Background Information

- Turkey is a candidate country for full membership to the European Union (EU).
- Turkey has to meet the accession requirements on several chapters including the environment.
- In Europe, the state of environment is assessed and reported (SoER) by using environment indicators.
- Turkey needs to improve the SoER format, hence needs to adopt new indicators.



TECHNICAL ASSISTANCE FOR ESTABLISHMENT OF TURKISH ENVIRONMENTAL INFORMATION EXCHANGE NETWORK (TEIEN) PROJECT (2009-2010) EuropeAid/125541/D/SER/TR





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Environmental Indicators

- Physical, chemical, biological or socioeconomic measures that best represent the key elements of a complex ecosystem or an environmental issue.
- Direct or indirect measure of environmental quality that can be used to assess status and trends in the environment's ability to support human and ecological health.

EEA Definition

Box 3.1 What is an environmental indicator?

An environmental indicator is a measure, generally quantitative, that can be used to illustrate and communicate complex environmental phenomena simply, including trends and progress over time — and thus helps provide insight into the state of the environment (EEA, 2005).



DPSIR Model



UNEP Human Environment Interaction Analytical Approach Built on the DPSIR Model



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UNEP (2006), "Environmental Indicators for North America." Division of Early Warning and Assessment (DEWA), P.O. Box 30552 Nairobi, Kenya.

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Methodology

- Based on DPSIR model
- Reflecting national requirements
- Policy compatibility
- International standards
- Covering environment sectors
- Reporting obligations
- Data availability

Methodology-2

- Indicator sets of different institutions
 - OECD, EEA, EUROSTAT, World Bank, UN
- Indicator sets of different countries
 - Norway, Slovenia, Malta, Slovak Republic, UK, Ireland
- Indicator sets of Turkey (already in use)
- Indicators proposed in EIS Project (2005)
- Indicators used in Indicators Booklets (2006 and 2008)

About the Set of Indicators

- 15 themes were determined by the former Ministry of Environment and Forestry.
- A total of 76 indicators were included into the set of national environment indicators.
- This set may be accepted as the "pool of indicators" and a subset of indicators may be used according to the specific reporting obligations.
- It is possible to select a set of key indicators from this pool to reflect the needs of our country.
- Data availability was investigated in order to calculate the proposed indicators.

Themes

- Climate change
- Air quality
- Water
- Waste
- Land use
- Nature Conservation and Biodiversity
- Energy
- Agriculture
- Industry
- Tourism
- Transportation
- Other Issues about Environmental Quality
 - Fisheries, Mining, Noise, Technological and Natural Disasters



Climate Change

	Proposed Indicator	Туре
TR 001	Total Greenhouse Gas Emission (GHG) and Sectoral Distribution (1000 TonS CO ₂ Eqv/year)	State
TR 002	Average Temperature (°C)	State
TR 003	Consumption of Ozone-Depleting Substances (ODS)	Pressure
TR 004	Precipitation (mm)	-
TR 005	CO ₂ Emission Per Capita (Tons CO2/cap)	Pressure
TR 006	Areas under the threat of desertification (km2)	State
TR 007	Fuel Consumption Per Capita for Highway	Driving
	Transportation (L)	force
TR 008	Sea Surface Temperature (°C)	-

Air Quality

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	Proposed Indicator	Туре
TR 009	Emission of Acidifying Substances (1000 tons, acidifying eqv)	Pressure
TR 010	Emission of Ozone Precursors (1000 tons, NMVOC eqv)	Pressure
TR 011	Emission of Primary Particulate Matter and Secondary Particulate Matter Precursors (1000 tons, particulate formation potential)	Pressure
TR 012	Exposure to Air Pollutants at Levels Exceeding Standard Limits in Urban Areas, SO ₂ (%)	State
TR 013	Exposure to Air Pollutants at Levels Exceeding Standard Limits in Urban Areas, Particulate Matter (%)	State
TR 014	Exposure to Air Pollutants at Levels Exceeding Standard Limits in Urban Areas, NO ₂ (%)	State

Air Quality (continued)

		Proposed Indicator	Туре
Wastewate sation	TR 015	Sources of Air Pollution (tons/year)	Pressure
Justrial Waste & eatment & Valori	TR 016	Concentrations of Lead, Benzene, CO, O ₃ , Arsenic, Cadmium, Mercury, Nickel and PAHs at Province/District Level (micrograms/m ³)	State
T T	TR 017	Air Pollutants in Urban Areas: NO _x , Particulate Matter, SO ₂ (micrograms/m ³)	State
WMA	TR 018	Air Pollutant Emissions from Transportation	-

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Water

	Proposed Indicator	
TR 019	Percentage of Annual Water Use from Renewable Sources (%)	Pressure
TR 020	Water use Per Capita (m³/year)	Pressure
TR 021	Nutrients in Freshwater Sources (NO ₃)/L, micrograms P/L)	State
TR 022	Oxygen Consuming Substances in Rivers (mg O ₂ /L, micrograms N/L)	State
TR 023	Population Connected to Waste Water Treatment Facilities (%)	Response
TR 024	Bathing Water Quality (%)	State
TR 025	Nutrients in Coastal and Sea Water (micrograms/L)	State
TR 026	Chlorophyll- A in Coastal and Sea Water (micrograms/L)	State



Waste

	Proposed Indicator	
TR 027	Amount of Urban Solid Waste Produced (Kg/cap-year)	Pressure
TR 028	Amount of Urban Solid Waste Collected (tons/year)	Response
TR 029	Urban Solid Waste Landfilled (%)	Response
TR 030	Waste Recycling Ratio (Kg/kg-cap)	Response
TR 031	Production and Recycling of Packaging Waste (kg/cap, %)	Response
TR 032	Medical Waste Collected Separately (Tons/year)	Response

Land Use

	Proposed Indicator	Туре
TR 033	Land Take	Pressure
TR 034	General Distribution of Land Cover (%)	State
TR 035	Agricultural Lands in Danger of Erosion (% or km ²)	State

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Nature Conservation and Biodiversity

Proposed Indicator		Туре
TR 036	The Ratio of Total Number of Endangered Species to the Total Number of Native Species (%)	Impact
TR 037	Protected Areas for Biodiversity (% or km2)	Response
TR 038	Change in Bird Population	State
TR 039	Endemism Ratio (%)	State

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Energy

	Proposed Indicator	
TR 040	Primary Energy Consumption by Fuel Type (%)	Driving force
TR 041	Total Primary Energy Consumption per Capita	Driving force
TR 042	Energy Consumption by Sector (1000 tons eqv petroleum)	Driving force
TR 043	Share of Renewable Energy Consumption in Total Energy Consumption (%)	Response
TR 044	Share of Renewable Electricity Production in Electricity Consumption (%)	Response

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Agriculture

	Proposed Indicator	Туре
TR 045	Area Under Organic Farming (ha)	Response
TR 046	Cultivated Land Per Capita (km2/cap)	State
TR 047 Productivity in Agriculture (TL/number of worker or TL/agricultural land)		Response
TR 048	Amount of Synthetic Fertilizer Consumed in Agricultural Sector (tons/year)	Pressure
TR 049	Total Pesticides Used in Agriculture (tons/year)	Pressure
TR 050	Gross Nutrient Balance (kg/ha)	Pressure

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Industry

Proposed Indicator		Туре
TR 05 I	Amount of Industrial Waste Recycled and Disposed (tons/GNDP)	Response
TR 052	Industrial Hazardous Waste Generation	Pressure
TR 053	The number of Industrial Establishments having Environmental Management System	Response



Tourism

Proposed Indicator		Туре
TR 054	The Number of Foreign Tourist Overnights Per Coastline as Km and Per Coastal Area as Km ² Per Year	Pressure
TR 055	Expenditures for Improving Tourism,TL or €/year	Pressure
TR 056	Numbe rof incoming tourists (number)	Pressure
TR 057	Number of Beds per 100 Settled People	Pressure
TR 058	The Number of Beaches and Marinas with Blue Flag	State

Transportation

	Proposed Indicator	Туре
TR 059	Freight Transportation Demand (tons-km, %)	Driving force
TR 060	Passenger Transportation Demand (passenger-km)	Driving force
TR 061	Use of Alternative Fuels in Highway Transportation (%)	Response
TR 062	Average Age of the Vehicle Fleet (years)	Pressure
TR 063	Passenger Transportation by Types (passenger-km)	Driving force
TR 064	Freight Transportation Types (tons-km)	Driving force
TR 065	Deaths in Traffic Accidents (number)	State



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	Туре	
TR 066	Fishing per Major Fish Groups (tons)	Pressure
TR 067	Aquaculture Production (tons)	Pressure
TR 068	Fishing Fleet Capacity (tons)	Pressure



Mining

	Proposed Indicator			
TR 069	The Number and Area of Mines (number, ha)	Pressure		
TR 070	The Ratio of Mines and Numbers of Service Area Rehabilitated after Operation (%, number)	Response		
TR 071	Contribution of Mining to GDP (%)	Pressure		



Noise

		Туре	
	TR 072	The Ratio of Population Exposed to Traffic Noise (%)	Impact
	TR 073	The Ratios of Population Exposed to Different Noise	Impact
	Sources Higher than 55 dB (%)	inipace	

Technological and Natural Disasters

	Туре	
TR 074	Forest Land Lost due to Fire (ha/year)	State
TR 075	Financial Loss by Type of Natural Disaster (TL)	Impact
TR 076	Technological Accidents and the Results by Types (number)	Pressure

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Remarks

- Among the set of indicators selected for Turkey, currently some of them can be implemented due to lack of data.
- For example, water indicators used:
 - Water use by sectors (Agriculture, Human Consumption and Industry),
 - Municipal water supplies
 - Number of municipalities serving the community with a treatment plant



Water Use by Sectors in Turkey



Source: General Directorate of State Hydraulic Works



Water Potential Available per Capita (m3/cap)



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The percentage of municipal population connected to a WWTP





Municipal Water Resources for Human Consumption



Water Poverty Index (WPI) Comparison (147 Countries)

Country	Resource	Access	Capacity	Use	Environment	WPI
Finland (1)	12.2	20.0	18.0	10.6	17.1	78.0
UK (II)	7.3	20.0	17.8	10.3	16.0	71.5
Greece (29)	9.3	20.0	17.4	8.9	10.0	65.6
Germany (35)	6.5	20.0	18.0	6.2	13.7	64.5
Congo Rep. (75)	17.1	10.3	11.8	7.3	10.9	57.3
Turkey (78)	7.8	14.8	13.1	10.7	10.1	56.5
Nigeria (129)	7.4	7.5	8.5	10.4	10.1	43.9

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WPI Component	Data Used	
Resources	internal Freshwater Flows	
	external Inflows	
	population	
Access	% population with access to clean water	
	% population with access to sanitation	
	 % population with access to irrigation adjusted by per capita water resources 	
Capacity	ppp per capita income	
	under-five mortality rates	
	education enrolment rates	
	Gini coefficients of income distribution	
Use	domestic water use in litres per day	
	 share of water use by industry and agriculture adjusted by the sector's share of GDP 	
Environment	indices of:	
	water quality	
	water stress (pollution)	
	environmental regulation and management	
	informational capacity	
	biodiversity based on threatened species	

The Water Poverty Index: an International Comparison, Peter Lawrence, Jeremy Meigh and Caroline Sullivan, Keele Economics Research Papers, Keele Unv, 2002.

Water Poverty Index



The water poverty index (WPI) is an aggregate index, describing the lack of freshwater. The index is calculated based on five components: resources, access, capacity, use, and environment, using indicators describing these.

Author: Hugo Ahlenius, UNEP/GRID-Arendal

Sources: World Resources Institute. 2006. EarthTrends - Freshwater indices: Water Poverty Index. Sullivan, C.A., Meigh JR and Fediw T (2002) Developing and testing the Water Poverty Index: Phase 1 Final Report. Report to Department for International Development, Centre for Ecology and Hydrology, Wallingford, UK.

Conclusions

- Turkey needs to take serious precautions and adopt sustainable water use strategy to minimize water stress in the future.
- Turkey also needs to improve in-situ monitoring and collection of data to increase the number of indicators used for national SoER and to satisfy the international reporting obligations.

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