Needs Assessment of Environmental Statistics in the Selected European and Central Asian countries: Data quality & reliability

Nader Motie Haghshenas [1]
Mohammad Mirzaie [2]
Arezou Sayadi [3]

Abstract

Environmental indicators provide a measure of existing and expected pressure on the Environment. The main aim of this paper is to highlight and identify needs of environmental statistics, by using data based on environmental indicators in the selected European countries comparing with Central Asian countries at the international publications. Data on environmental statistics are mainly taken from the *Statistical Yearbooks* for the selected European and central Asian countries,1995-2007. In addition, we used the international organization databank (Such as UN, ESCAP, OECD, EUROSTAT, World Bank) for certain years. The research is carried out on documentary method and is based on a comparative approach. The selected indicators based on sufficient time-series data are used to answer the question that do countries with different historical experiences and development levels manifest similar quality and body of environmental data producing at the international level? According to Kaufman theory on needs, needs assessment is a process for determining and addressing needs, or "gaps" between current conditions and desired conditions. All indicators are presented in an agreed format to support their practical application in the studied countries. It should be kept in mind that definitions and measurement methods vary among countries, and that inter-country comparisons require careful interpretation. But since indicators presented in this paper refer to both national and international level, we follow the comparison among environmental statistics of studied countries as well. It involves identifying material weaknesses and strengths, and evaluating possible solutions that take those qualities into consideration by national and international authorities.

Key words: Data Needs, Environmental Statistics, Comparative Approach

----
[1] Faculty Member, National Institute of Population Research, & Ph.D Student in Demography,Department of Demography,Faculty of Social Sciences, University of Tehran, Corresponding Person: nmhaghshenas@ut.ac.ir.
[2] Professor in Demography, Department of Demography, Faculty of Social Sciences, University of Tehran.
[2] Researcher in Population and Environment field.

0

Introduction

Environmental issues are increasingly becoming the subject of policy makings. In sustainable development approach, environmental matters are jointed to socio-economic issues of development at national and international levels. Related resources are scattered among various information-collector institutes using different methods. The purpose of organizing environmental statistics is to overcome ambivalence having been provided through the combination of data on different subject and sources.

The interdisciplinary nature of environmental statistics as well as diversity of statistic producers and consumers proposes the necessity of a comparative analysis of data access and coordination of collecting, processing and publishing them. Many efforts have been made in the national and international levels to provide environmental statistics, frameworks for the design of a statistical project or to make data available in a coherent statistical publication. These efforts were assessed by the Census Bureau, United Nations Secretariat a few years ago to determine the common characteristics that could widely be used in an international framework.

Relying on the results of this evaluation, clarifying different aspects of environmental statistical variables to describe the possible quantity of environmental affairs appeared to be necessary.

Environmental indicators are a key tool for environment assessment in the countries based on sufficient time-series data to show key trends, help to describe causes and effects of environmental conditions and pave the way to follow implementation of appropriate policies.

Since a wide variety of environmental indicators presently in use reflects the trends of environmental status the necessity of monitoring and evaluating the progress made in realizing environmental policy targets for policy-makers is created.

There are different categories to show the environmental condition. Standardization and comparability of the environmental data among the different countries throughout the world is extremely important to depict a universal picture of the environment. We are increasingly facing environmental problems such as Acid rain, Air pollution, Global warming, Hazardous waste, Ozone depletion, Smog, Water pollution, Over population and Rain forest destruction. Therefore, the need for source of the problems as well as recognition of the patterns of dealing with environmental issues turns out to be more and more brilliant. The statistics will be more complex if they can not be used clearly with capability of comparison. Thus environmental statistics must be clarified and classified as soon as possible. In addition the difference between the national and international statistics has resulted in a widespread effort to remove statistical gaps.

Accordingly this study comprises following important purposes:

1. How is the status of environmental indicators among the selected European countries?
2. How is the status of environmental indicators among the selected central Asian countries?
3. Do countries with different historical experiences and development levels manifest similar quality and condition of environmental data at the international level?
4. What are the gaps between the produced and presented statistics of environment in the selected countries and how could they be filled?

Data and Method

Data on environmental statistics are mainly taken from the *Statistical Yearbooks* for the selected European and central Asian countries, 1995-2007. In addition, we used the international organization databank (Such as UN, ESCAP, OECD, EUROSTAT, World Bank) for a definite time. The research is carried out on documentary method and is based on a comparative approach.

Theoretical Framework

Understanding the concept of need largely depends on one's perception and the society or the context which is studied. The concept of need is relative and it is influenced by values, attitudes and norms. Any need assessment technique is based on special definition of need and its domain and boundaries. Therefore, it is necessary to consider diverse opinions and perceptions in relation to the concept of need and consequently need assessment to clarify the concept.

Psychologists divide "need" into two groups of primary and secondary needs. Physiologists pay attention to the biologic aspect of "need", whereas for economists, need is important as far as customers demand is concerned. Regardless of specialists, public has different understanding of need concept.

Generally from the social point of view definitions of need can be divided into four categories:

A: Need as a gap between current and desired conditions

One of the most common and accepted definitions of need is the definition proposed by Kaufman. He suggests that need denotes the situation in which current condition is distant from desired condition and need assessment means to close the gap between the current and ideal condition and making the priorities to proceed as well . Gilley and Eggland define need as a gap between a group of current and desired conditions and

they consider the process of measurement and scientific evaluation of these gaps as need assessment.

Bradshaw boor believes that this definition will limited our actions to determine the desired condition (goals), current actions (current condition), and measure the gap between these two. Then we need to revise the previous definition of need assessment. Therefore, need assessment means the process of goals determination, presenting the current condition, measuring the needs and making the priorities to proceed. This definition of need assessment considers the issue of prioritizing the needs in terms of their importance.

B: Need as a desire or preference

Need assessment, from this point of view, is the process of reviewing, and gathering opinions of individuals and groups about needs and creating consensus among the different views. What makes the core of this theory is that views and ideas of individuals and groups in relation to needs is the main focus of the need assessment, not the gap between the existing and preferred situation. If need is considered as an individual's desire, it will be necessary in need assessment process to concentrate on the efforts for determining the perceptions and the opinions of people.

C: Need as a defect or shortcoming

From this point of view, need assessment is the process of identifying negative functions or the factors which negatively influence on the function and this view consist of amendatory and reformatory suggestions. In other words according to Scriven's definition of need, need assessment is the method of recognizing the issues, difficulties and shortcoming in individuals and organization's performance, which contains the recognition of ideal condition and diagnosis of problems and difficulties of the current situation.

D: Synthetic approach

Here all the descriptions mentioned above are accepted. Need assessment is considered as a process of identification the gap between the current and ideal situation, and determination of weakness points as well as review of opinions and attitudes.

Operational Definition of Concepts

According to Kaufman theory and social perception of needs assessment definition, and its key conceptions with emphasis on population approach have been described as follows:

Needs assessment of environmental statistics: it is a process by which optimal condition is achieved from current status of statistical items, based on important programmed needs in terms of priorities.

Produced environmental statistics: it is a condition of statistics production in which items have been presented in the surveys and international publications.

Not produced environmental statistics: it is a condition of statistics production in which items have not been presented in the surveys and international publications.

Data gap: it is a condition of statistics production in which some items of statistics and data are not available among international surveys and publications.

Reference time: the first period of time in which data is available.

Definition of environmental indices

Air pollution changes in natural features of atmosphere created by chemicals, dust particles or biological elements that cause harm or discomfort for humans or other living organisms, or damages the natural environment into the atmosphere.

An air pollutant is known as a substance in the air that can cause harm to humans and the environment. Pollutants can be in the form of solid particles, liquid droplets, or gases. In addition, they may be natural or man-made.

Pollutants can be classified as either primary or secondary. Usually, primary pollutants are substances directly emitted from a process, such as ash from a volcanic eruption, the carbon monoxide gas from a motor vehicle exhaust or sulfur dioxide released from factories.

Secondary pollutants are not emitted directly. Rather, they form in the air when primary pollutants react or interact. An important example of a secondary pollutant is ground level ozone — one of the many secondary pollutants that make up photochemical smog.

Note that some pollutants may be both primary and secondary: that is, they are both emitted directly and formed from other primary pollutants.

Major primary pollutants produced by human activity include:

- ❖ Sulfur oxides (SO_x) - especially sulfur dioxide, a chemical compound with the formula SO_2. SO_2 is produced by volcanoes and in various industrial processes. Since coal and petroleum often contain sulfur compounds, their combustion generates sulfur dioxide. Further oxidation of SO_2, usually in the presence of a catalyst such as NO_2, forms H_2SO_4, and thus acid rain. This is one of the causes for concern over the environmental impact of the use of these fuels as power sources.

- ❖ Nitrogen oxides (NO_x) - especially nitrogen dioxide are emitted from high temperature combustion. Can be seen as the brown haze dome above or plume downwind of cities. Nitrogen dioxide is the chemical compound with the formula NO_2. It is one of the several nitrogen oxides. This reddish-brown toxic gas has a characteristic sharp, biting odor. NO_2 is one of the most prominent air pollutants.

- ❖ Nitrous oxide (N2O) is produced by both natural and human-related sources. Primary human-related sources of N2O are agricultural soil management, animal manure management, and sewage treatment, mobile and stationary combustion of fossil fuel, adipic acid production, and nitric acid production. Nitrous oxide is also produced naturally from a wide variety of biological sources in soil and water, particularly microbial action in wet tropical forests.

- ❖ Carbon monoxide (CO), also called carbonic oxide, is a colorless, odorless and tasteless gas which is lighter than air. It is highly toxic to humans and animals in higher quantities, although it is also produced in normal animal metabolism in low quantities, and is thought to have some normal biological functions.

- ❖ Carbon dioxide (CO2) is a colorless, odorless and non-poisonous gas formed by combustion of carbon and in the respiration of living organisms and is considered a greenhouse gas. Emissions mean the release of greenhouse gases and/or their precursors into the atmosphere over a specified area and period of time.

- ❖ A chlorofluorocarbon (CFC) is an organic compound that contains carbon, chlorine, and fluorine, produced as a volatile derivative of methane and ethane. A common subclass is the hydro-chloro-fluoro-carbons (HCFCs), which contain hydrogen, as well.

- ❖ Methane is a chemical compound with the chemical formula CH4. It is the simplest alkane, and the principal component of natural gas. Methane's bond angles are 109.5 degrees. Burning methane in the presence of oxygen produces carbon dioxide and water. The relative abundance of methane makes it an attractive fuel. However, because it is a gas at normal temperature and pressure, methane is difficult to transport from its source. In its natural gas form, it is generally transported in bulk by pipeline or LNG carriers; few countries transport it by truck.

- ❖ Greenhouse gases are gases in an atmosphere that absorb and emit radiation within the thermal infrared range. This process is the fundamental cause of the greenhouse effect. The main greenhouse gases in the Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone. In our solar system, the atmospheres of Venus, Mars and Titan also contain gases

that cause greenhouse effects. Greenhouse gases greatly affect the temperature of the Earth; without them, Earth's surface would be on average about 33 °C (59 °F) colder than at present.

- ❖ The stratospheric ozone layer protects the planet from ultraviolet radiation. The release of certain manmade chemicals containing chlorine and bromine damages the ozone layer, resulting in harm to human health and the environment. The main ozone-depleting substances include chlorofluorocarbons (CFCs), halons, methyl chloroform, carbon tetrachloride, hydro-chloro-fluoro-carbons (HCFCs) and methyl bromide. These chemicals are used in refrigeration and air conditioning equipment, aerosol sprays, fire extinguishers, foamed plastics and pesticides Potential health impacts arising from damage to the ozone layer include sunburn, skin cancer, eye cataracts and reduced efficiency of the immune system. Environmental damage may be inflicted on crops, trees and animals, particularly phytoplankton and zooplankton, the tiny plants and animals living in the surface layers of lakes and oceans.

- ❖ Waste management is the collection, transport, processing, recycling or disposal, and monitoring of waste materials. The term usually relates to materials produced by human activity, and is generally undertaken to reduce their effect on health, the environment or aesthetics. Waste management is also carried out to recover resources from it. Waste management can involve solid, liquid, gaseous or radioactive substances, with different methods and fields of expertise for each. Waste management practices differ for developed and developing nations, for urban and rural areas, and for residential and industrial producers. Management for non-hazardous residential and institutional waste in metropolitan areas is usually the responsibility of local government authorities, while management for non-hazardous commercial and industrial waste is usually the responsibility of the generator.

- ❖ Waste collection is the component of waste management which results in the passage of a waste material from the source of production to either the point treatment or final disposal. Waste collection also includes the Kerbside collection of recyclable materials that technically are not waste, as part of a municipal landfill diversion program.

- ❖ Transport or transportation is the movement of people and goods from one location to another. Modes of transport include air, rail, road, water, cable, pipeline, and space. The field can be divided into infrastructure, vehicles, and operations.

6

- ❖ Waste treatment refers to the activities required to ensure that waste has the least practicable impact on the environment. In many countries various forms of waste treatment are required by law.
- ❖ Recycling involves processing used materials into new products to prevent waste of potentially useful materials, reduce the consumption of fresh raw materials, reduce energy usage, reduce air pollution (from incineration) and water pollution (from land filling) by reducing the need for "conventional" waste disposal, and lower greenhouse gas emissions as compared to virgin production. Recycling is a key component of modern waste reduction and is the third component of the "Reduce, Reuse, Recycle" waste hierarchy.
- ❖ Municipal waste contributes to several environmental problems including habitant destruction, surface and groundwater pollution and other forms of air, soil and water contamination. Depending on the disposal method, there may be other negative consequences, such as the creation of toxic substances through incineration. Landfills also emit methane (which contributes to global warming) and other gases.

Results

Table (1) shows indicators of pollution issues[1] in terms of data production and presented at the national and international level for Iran according to latest data which refers to 2006 and 2007.

Table 1- Environment Statistics of Iran at the National and International Level (2006-2007)

Indicators	National level		International level	
	Status of Statistics		**Status of Statistics**	
	Produced	**Not produced**	**Presented**	**Not Presented**
Total NOx Emissions		*		*
Total SO2 Emissions		*		*
consumption of all ODS	*		*	
Consumption of CFCs	*		*	
CH4 Emissions	*			*
CO2 Emissions per capita	*		*	
CO2 Emissions	*		*	
GHG Emissions	*			*
N2O Emissions	*			*
Municipal waste collection		*		*

Source: (UNSD), United Nation Statistics and (ESCAP) Economic and Social Commission for Asia and the Pacific

---

[1] Pollution issues are one of OECD set of key environmental indicators. These key indicators have been selected from the core indicators included in the OECD core set of environmental indicators and are closely related to other environmental indicators sets developed and used by the OECD. Their selection took into account: their policy relevance with respect to major challenges for the first decade of the 21st century, including pollution issues and issues related to natural resources and assets. Pollution issues consist of Climate change, Ozone layer, Air quality, waste generation and freshwater quality. All indicators in this report are related to pollution issues as a key environmental indicator.

Table 2- Environment Statistics of Turkey at the National and International Level (2006-2007)

Indicators	National Level		International Level	
	Status of Statistics		Status of Statistics	
	Produced	Not Produced	Presented	Not presented
Total NOx Emissions	*		*	
Total SO2 Emissions	*		*	
consumption of all ODS	*			*
Consumption of CFCs	*			*
CH4 Emissions	*		*	
CO2 Emissions per capita	*		*	
CO2 Emissions	*		*	
GHG Emissions	*		*	
N2O Emissions	*		*	
Municipal waste collection	*		*	

Source: (UNSD), United Nation Statistics, (OECD) Organization for Economic Cooperation and Development, and European Commission (eurostat)

Table 3- Environment Statistics of Pakistan at the National and International Level (2006-2007)

Indicators	National Level		International Level	
	Status of Statistics		Status of Statistics	
	Produced	Not Produced	Presented	Not Presented
Total NOx Emissions		*		*
Total SO2 Emissions		*		*
consumption of all ODS	*		*	
Consumption of CFCs	*		*	
CH4 Emissions		*		*
CO2 Emissions per capita	*		*	
CO2 Emissions	*		*	
GHG Emissions		*		*
N2O Emissions		*		*
Municipal waste collection		*		*

Source: (UNSD), United Nation Statistics and (ESCAP) Economic and Social Commission for Asia and the Pacific

Table 4- Environment Statistics of Austria at the National and International Level (2006-2007)

Indicators	National Level		International Level	
	Status Of Statistics		Status Of Statistics	
	Produced	Not Produced	Presented	Not Presented
Total NOx Emissions	*		*	
Total SO2 Emissions	*		*	
consumption of all ODS	*			*
Consumption of CFCs	*			*
CH4 Emissions	*		*	
CO2 Emissions per capita	*		*	
CO2 Emissions	*		*	
GHG Emissions	*		*	
N2O Emissions	*		*	
Municipal waste collection	*		*	

Source: (UNSD), United Nation Statistics, (OECD) Organization for Economic Cooperation and Development, and European Commission (eurostat)

Table 5- Environment Statistics of Denmark at the National and International Level (2006-2007)

Indicators	National Level		International Level	
	Status of Statistics		Status of Statistics	
	Produced	Not Produced	Presented	Not Presented
Total NOx Emissions	*		*	
Total SO2 Emissions	*		*	
consumption of all ODS	*			*
Consumption of CFCs	*			*
CH4 Emissions	*		*	
CO2 Emissions per capita	*		*	
CO2 Emissions	*		*	
GHG Emissions	*		*	
N2O Emissions	*		*	
Municipal waste collection	*		*	

Source: (UNSD), United Nation Statistics, (OECD) Organization for Economic Cooperation and Development, and European Commission (eurostat)

Table 6- Environment Statistics of Finland at the National and International Level (2006-2007)

Indicators	National level		International level	
	status of statistics		status of statistics	
	Produced	Not produced	Presented	Not Presented
Total NOx Emissions	*		*	
Total SO2 Emissions	*		*	
consumption of all ODS	*			*
Consumption of CFCs	*			*
CH4 Emissions	*		*	
CO2 Emissions per capita	*		*	
CO2 Emissions	*		*	
GHG Emissions	*		*	
N2O Emissions	*		*	
Municipal waste collection	*		*	

Source: (UNSD), United Nation Statistics, (OECD) Organization for Economic Cooperation and Development, and European Commission (eurostat).

Tables (1-6) showed that the status of environmental indicators among the selected European countries in comparing to the selected central Asian countries (except for Turkey) is different remarkably.

Summary and Policy Implications

Development plans are normally developed based on the achievement of a set of priority goals, which are measured by changes in the value of well-defined indicators. Analysis of these indicators also permits the ongoing assessment of the development plans. Many of these indicators are historically well established ones in each country.

Environmental indicators are a key tool for environment assessment in the countries based on sufficient time-series data to show key trends, help to describe causes and effects of environmental conditions and pave the way to follow implementation of appropriate policies.

Standardization and comparability of the environmental data among the different countries throughout the world is extremely important to depict a universal picture of the environment. We are increasingly facing environmental problems such as Acid rain, Air pollution, Global warming, Hazardous waste, Ozone depletion, Smog, Water pollution, Over population and Rain forest destruction. Therefore, the need for source of the problems as well as recognition of the patterns of dealing with environmental issues turns out to be more and more brilliant. The statistics will be more complex if they cannot be used clearly with capability of comparison.

Thus environmental statistics must be clarified and classified as soon as possible. In addition the difference between the national and international statistics has resulted in a widespread effort to remove statistical gaps.

This paper showed that the status of environmental indicators among the selected European countries in comparing to the selected central Asian countries (except for Turkey) is different remarkably. Collaborative efforts of the international organizations, civil society, local government, policymakers and stakeholders have a significant role to remove data gap in the world. It involves identifying material weaknesses and strengths, and evaluating possible solutions that take those qualities into consideration.

Bibliography /References

Bakker,K. and C.Morinville. 2013. The Governance Dimensions of Water Security: A review. Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Science. 371 (2002),

De Sherbinin, A., and V. Dompka (eds.). 1998. Water and Population Dynamics: Case Studies and Policy Implications. Washington, DC: American Association for the Advancement of Science,

European commission (EUROSTAT) 1995-2007,

INE, National Statistics Institute of Spain, 1995-2007,

Kaufman, R., & English, F. W. (1979). Needs assessment: Concept and Application. Englewood Cliffs, NJ: Educational Technology Publications,

McDonald, R.I., P. Green, D. Balk, B.M Fekete, C. Revenga, et al. 2011. Urban growth, Climate Change, and Freshwater availaibilty. PNAS. doi:/10.1073/pnas.1011615108,

McLeman, R., J. Dupre, L.B. Ford, J. Ford, K. Gajewski, and G. Marchildo. 2014. What we learned from the Dust Bowl: lessons in science, policy, and adaptation. Population and Environment, 35(4): 417–440.2014,

Organization for Economic Cooperation and Development.2008.Key Environmental Indicators, Paris, France,

Segnestam, Lisa .2002. Indicators of Environment and Sustainable Development: Theories and Practical Experience, World Bank, Washington D.C, USA, NO. 89,

United Nations.2001.World Population Monitoring: Population, Environment and Development, New York,

United Nations, Economic and Social Commission for Asia and the Pacific (ESCAP), 2006-2007,

United Nations Statistics Division (UNSD) 2006-2007, New York,

United Nations Environment Program (UNEP) 1990-2007, New York,

World Economic Forum (WEF). 2014. Global Risks Report 2015. Geneva: WEF.