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Documents

A Review of the Report *"Environment Statistics in China"*

Statistics Norway
Statistisk sentralbyrå

Preface

This review is an activity under the ***Partnership Agreement between the State Statistical Bureau of China and Statistics Norway***, and is part of the project module ***«more comprehensive and widespread publications and improved methods of presentation».*** The review has been prepared by Mr. Frode Brunvoll in cooperation with Ms. Solveig Glomsrød, Mr. Sigurd Holtskog and Ms. Kristin Rypdal. Statistics Norway.

Contents

1. Introduction

The report «*Environment Statistics in China*» was written in the light of the objectives of the Expert Group Meeting (To improve environmental statistics in the ESCAP region) organised by ESCAP in 1993.

The cooperation that has been established between mainly the State Statistical Bureau of China (SSB) and the National Environmental Protection Agency (NEPA), and – as we understand it from the *Editor's Notes* – also other institutions, is a very positive and valuable initiative that should be continued in the work with environment statistics and environmental reporting in The People's Republic of China. The report that has been prepared by these institutions is an important basis for further development of this area.

Based on experiences from Norway in a similar co-operation, all the participating parties can benefit from such an exercise. This can apply to for example:

- Data availability
- Supplementary competence in the institutions
- Shared experiences; recognition of data needs
- Common responsibility and efforts
- Status and quality of the report

In this review we will try to present some comments to the report *Environment Statistics in China* based on our own experiences with environmental statistics and publication activities in Statistics Norway. Hopefully, this will be of some value in the further development of environment statistics publications in China.

2. Structure of environment statistics reports

Important guidelines concerning *structure* and *contents* of environment statistics can be found in the following reports from the United Nations:

- A Framework for the Development of Environment Statistics (UN 1984).
- Concepts and Methods of Environment Statistics. Human Settlements Statistics - A Technical Report (UN 1988).
- Concepts and Methods of Environment Statistics. Statistics on the Natural Environment (UN 1991).

These UN publications are mainly about the framework, structure and contents of the environment statistics system, but this should also to some degree be reflected in environment statistics reports.

2.1. Experiences in Statistics Norway

In Statistics Norway we are – in cooperation with several environmental agencies – preparing an environment statistics/state of the environment report with a 5 year interval. In this report we have chosen the following structure:

1. Basic background information
2. Factors influencing the environment and use of natural resources
3. State of the environment
4. Global environmental problems
5. Protection of nature and the environment

In **part 1** we present *basic data* concerning weather and climate, soil and geology, freshwater and marine waters, vegetation and land use (the basis for natural resources and the natural conditions that are affected by the pressures and pollution presented later in the report). In **part 2** we present the factors – the *pressures* – that affect the environment and the natural resources. This part has to a considerable degree a sectoral breakdown: Population, agriculture, forestry, fishing, manufacturing industries, transport and energy. In these chapters we seek to present important information concerning the development of these sectors and how they affect the environment through pollution and use of resources. In addition themes like air emissions (overview), long-range transported pollution, waste and chemical substances and products are also presented in this part. In **part 3** the *state* of the environment is described. We have structured this part according to «nature type» (cities, cultural landscapes, forests, wetlands, mountains, rivers and lakes, coast and marine environment. In addition, biodiversity is treated in a separate chapter. As an example: In Part 2 relevant data concerning the development and structure of the agricultural sector are presented together with data concerning the main environmental impacts of agricultural activities such as soil erosion, emissions to water and air, etc. In part 3 the state of the cultural landscape is described with emphasis on how agricultural activities have changed the landscape and the consequences these changes have on flora and fauna. Irrespective of structure it will always be some problems with overlap; in the description of the state it is often of interest to mention both pressures and responses, and it is eventually an editorial task to find the right balance. **Part 4** presents the three main global environmental problems *climate change, stratospheric ozone depletion* and *global biodiversity.* Finally, in **part 5**, we address environmental protection issues and try to give an overview of what society is doing to protect the environment; the *responses*. This includes information on nature management, international agreements, monitoring, expenditures and investments, laws and regulations and public attitudes towards environmental issues. The complete contents of the 1994 edition of the Norwegian environment statistics publication (SSB, DN and SFT 1994) are presented in Appendix I.

This structure is to a considerable degree based on the so-called *pressure–state–response* framework. We first describe the *pressures* of pollution and use of resources, these pressures affects the *state* of the environment, and society's *response* is either to prevent or reduce the pressures on the environment or to repair or protect the state of the environment. This framework is frequently used by countries in environment statistics or state of the environment reports.

The order of the main parts may vary; some may for example prefer to present the *state* information before the *pressures.*

Statistics Norway has recently carried out an evaluation of the Norwegian environment statistics report from 1994. The respondents were asked, among other things, to comment on the structure that had been chosen (see Appendix). One important comment we received was that it is important with a logical structure, however, there are several ways of obtaining this, and the most important thing – no matter what structure that is chosen – is how the subject matter is presented in text, tables and graphics.

2.2. Different alternative structures

There are several ways of structuring environment statistics, state of the environment reports or environmental indicator reports. Some main structures can however be emphasised:

i) According to problem area or issue:

Alternative I
- Climate change
- Ozone layer depletion
- Eutrophication
- Acidification
- Toxic contamination
- Urban environmental quality
- Biodiversity
- Waste
- Water resources
- Forest resources
- Fish resources
- Soil degradation
- General data

Alternative II
- Climate Change
- Ozone Layer Depletion
- Loss of Biodiversity
- Resource Depletion
- Dispersion of Toxics
- Waste
- Air Pollution
- Marine Environment & Coastal Zones
- Water Pollution & Water Resources
- Urban Problems, Noise & Odours

The examples above are taken from the OECD core set of environmental indicators (OECD 1994) (*Alt. I*, left), and from the ten «policy fields» defined in *The Pressure Indices Project* of the European Commission (Commission of the European Communities 1996) (*Alt. II*, right).

ii) According to sectors:
- Energy
- Agriculture
- Forestry
- Fishing
- Mining and quarrying
- Manufacturing industries
- Transport
- Public sector
- Households

iii) According to main recipient of pollution or other impacts:
- Air
- Inland waters
- Marine waters
- Land

It is not possible to say that one is better than the other, and in practice different national and international environment statistics publications have a mixture of these «main» structures, but with varying degrees concerning what is emphasised.

2.3. The present structure of «Environment Statistics in China»

The report *Environment Statistics in China* contains 9 chapters:

1. Natural State and Natural Resources
2. Population and Consumption of Residents
3. Agriculture

4. Transportation and Communication
5. Energy
6. City Construction
7. State of Environmental Pollution
8. Environmental Protection
9. Marine Environment

This structure is a mix of *«background»* data (1 and 2), sector information (parts of 2 – if we consider population or households as a sector – 3, 4 and 5), pollution or pressures on the environment (7), and ecosystem or thematic information (6 and 9). The present structure could perhaps be characterised as mainly «sectoral», and with some additional chapters presenting general overviews (1 and 7).

An example of a very simple restructuring of the chapters in the report *Environment Statistics in China* may – taking the comments in the previous paragraphs of chapter 2 into account – therefore be something like this (some examples of tentative additions are presented in *italics*, but this will be commented more extensively in chapter 3 of this review):

Background information
- Natural state and Natural Resources

Pressures on the environment
- Population and Consumption of Residents
- Agriculture
- *Forestry*
- *Fisheries*
- *Manufacturing industries*
- Transportation and Communication
- Energy
- State of Environmental Pollution

State of the environment
- *Urban environment* (now partly in City Construction and in State of Environmental Pollution)
- Marine Environment
- *Inland Waters*
- *Forests*
- *Wetlands*

Societal responses
- Environmental Protection

This structure is really not very different from the one already adopted in the Chinese environment statistics report (except for the new superior levels), but one should keep the *pressure–state–response* framework in mind both when considering expansion of the contents (new chapters) and when composing and editing the individual chapters.

3. Contents and selection of data

Substantial efforts seem to have been made to collect both background data, relevant environmental data and resource related data. In the following, some comments are made concerning the contents of the report based on experiences from environment statistics work in Norway. The comments may be taken into account as the work of establishing the statistical basis for environment statistics in China progresses, and further development – both in the short and long term – of publications in this area is undertaken.

When developing environment statistics one should also take into consideration the data needs in connection with different kinds of international reporting, and try to adopt international standards and definitions. Here we can refer to the *ECE Standard Statistical Classifications and Definition of Terms*. The publication *Readings in International Environment Statistics* (UN-ECE 1993) presents these classifications, and includes also a bibliography of methodological papers on environment statistics
prepared for the Conference of European Statisticians.

The United Nations Statistics Division has also prepared a *Glossary of Environment Statistics* (UN 1997) that could be useful.

3.1. Main topics or themes that can be included

Fisheries and fish resources *(is included in chapter 3. Agriculture, but could deserve a separate chapter).* Such a chapter could include information on stock development of important fish species, total catch and catch of different fish species or groups of species, catch of crustaceans, molluscs, etc. Production in fish farming and other types of aquaculture could be included (see comments in 3.2 under Agriculture). Figures for imports and exports of fish and fish products could be included, together with indicators showing the importance of fisheries and aquaculture in the national economy, for example as share of employment and GDP.

Forestry and forest resources *(is included in chapter 1. Natural State and Natural Resources, in chapter 3. Agriculture, and in chapter 8. Environmental Protection, but to a very limited degree. Could deserve a separate chapter).* More information concerning the evolution of forests would be highly relevant. Is the volume increasing or decreasing, how much roundwood is cut, for what purposes is the timber used, what is the relationship between growth and removal, are there regional differences, etc. From an «energy» point of view the amount of fuelwood extracted from the forests would be very relevant. Indicators showing the importance of forestry in the national economy, for example as share of employment and GDP could be included.

Manufacturing industries (mining and quarrying included). Basic information on manufacturing industries of resource and environmental significance could be presented in such a chapter. This could include data on employment, number of establishments, use of raw materials, production, contribution to GDP, discharges to water, emissions to air, etc.

Global problems

- Climate change
- Ozone layer depletion
- Loss of biodiversity

Societal responses *(is already to some degree included in Chapter 8 Environment Protection and in the article Chronicle Events of Environmental Protection in China, but this could be expanded to include a comprehensive presentation of:* legal acts, different kind of regulations, nature conservation, monitoring, taxes, environmental protection expenditures, etc.)

A separate chapter for solid waste. This chapter could include all types of waste (from households, industries, hazardous waste, etc.). The chapter should present waste amounts, waste materials, waste treatment and recycling.

A separate chapter for air emissions. This chapter could include a general overview of air

emissions, presenting trends for total emissions, distribution on different sources (mobile, stationary, processes) and industries (households, manufacturing industries, energy sector, etc.). To the degree that the data basis allows it, regional figures (for example for the provinces of China) could be included.

A separate chapter for discharges to water. This is probably a more difficult task than air emissions, but it should be considered as an option. These two suggestions for separate chapters for air emissions and discharges to water imply that chapter 7. *State of Environmental Pollution* in the present report should be split up into separate chapters.

Comparisons with other countries or regions. This could be included in the different chapters, and could contain a presentation of important key data in China compared with data from a selection of other countries. Such international comparisons are also possible to present in a separate chapter.

In *Environment Statistics in China* the only «nature type» or environment that is described in a separate chapter is the marine environment, and to some degree the urban environment. It would perhaps be a good idea to include other «nature types»:

Chapters on the *state* of the environment

- Inland waters (rivers and lakes)
- Agricultural areas
- Forests
- Wetlands
- Mountain areas
- Others «nature types» of major importance in China
- Biodiversity

3.2. Comments to the selection of data for the main topics

In this paragraph rather detailed comments are made on the selection and presentation of data presented in the 9 chapters of *Environment Statistics in China.* Some suggestions for further data in these chapters are also made.

Background and Objective; Environment Statistics in China; The Relations between Environmental Protection and Development of Social Economy

These introductory paragraphs make up a relevant introduction that present background information concerning the development of environment statistics and the purpose of the report.

Chapter 1. Natural State and Natural Resources

Much relevant basic information is presented in this chapter.

- Generalised maps showing for example the provinces of China, the population density of these provinces, distribution of annual precipitation (maybe with graphs showing annual variation for selected localities superimposed on the map), etc. would improve this chapter considerably.
- Tables 1.02 *Statistics on Land* and 1.03 *Statistics on Natural Resources:* The mix of units in these tables is somewhat confusing. For example: In table 1.02 there is mix of hectares and km^2. The total area of different land use categories in table 1.03 are presented in *hectares,* and the per capita figures are presented in *mu.* This is really a general comment applying to several of the tables in the report.
- For international use, the unit *mu* should have been defined (as far as we can understand, 1 ha = 15 mu and 1 mu = 666.7 m^2).
- Table 1.03: What is the definition of «Forestry land»? The area of this land use category is over two

times the area of forest (corresponding to a forest cover of 13.4 per cent) presented below in the same table.
• In the description of water resources a distinction should have been made between *hydropower resources (energy resource)* and *water resources (material or environment resource).*

Chapter 2. Population and Consumption of Residents
• A graph showing the trend in the GDP growth, and also an overview of which sectors that are of greatest importance could be included.
• What is the unit of table 2.04 *Annual Average Consumption of Urban and Rural Residents?*

Chapter 3. Agriculture
This is an interesting chapter with much relevant information.
• One could, however, consider to treat *Forestry* and *Fisheries* in separate chapters. Concerning *aquaculture* the part of this industry that is an integrated part of agriculture could be included in this chapter, and the perhaps more specialized part of aquaculture in the coastal area or marine environment could be included in a separate chapter on fisheries.
• Interesting information on soil erosion, desertification, soil salinization, use of chemicals and fertilizers is already included in the chapter. Data on run-off of plant nutrients (from manure and fertilizers), other discharges to water, etc. could perhaps be included in subsequent editions of the report. Farm chemicals could perhaps also be specified according to main ingredients (tons of active ingredients), and fertilizers could be specified as tonnes of phosphorus, nitrogen and potassium.

Chapter 4. Transportation and Communication
• If available, statistics on the use of bicycles could be included.
• Statistics for the number of road vehicles (private cars, vans, lorries, buses, etc.) should be included.
• Statistics for the number of vehicle-kilometres driven could also be included.
• Table 4.01 *Length of Various Routs:* Routs of civil aviation and International rout should be defined.
• Tables 4.02 and 4.03: The units are probably *billion passenger-kilometres* and *billion ton-kilometres*? (not bill. Km/people and bill. Tons/Km).
• Table 4.04: No unit is indicated for the figures of this table.

Chapter 5. Energy
• If available, statistics on the use *biofuels* would be useful.
• If available, statistics on the use of *crop residues, fuelwood, dung (manure)* for heating and cooking could be included.
• The structure of this chapter should be: reserves, production, imports and exports, and use. See for example the energy chapter of *Natural Resources and the Environment 1997* (Statistics Norway 1997). As far as we can see, reserves and imports and exports are not included in the present report.
• Information on the reserves/production rate (the r/p rate) should be included for relevant energy sources.
• All tables concerning energy production and use should be presented both in energy units (preferably Joule) and weight or volume units (tonnes, m^3, etc.).
• If available, statistics concerning *energy prices* (selected energy goods or fuels; gasoline, fuel oil, electricity, etc.) would be useful.
• A table showing energy consumption for *transport,* Use of energy goods as *raw materials,* and energy use for *stationary* purposes should be included.
• Tables 5.02 *Total Energy Consumption and its Composition* and 5.03 *Average Daily Consumption:* It is important to distinguish between *primary supply or consumption* of energy (total consumption of energy included consumption in the energy sectors) and *secondary or net consumption* (where use of energy goods – both as fuel and raw material – in the energy sectors, oil refineries, etc. is excluded). In table 5.02; is for example «petroleum» part of the *primary consumption* and «fuel» part of the *secondary consumption?* In table 5.03; what does the average daily consumption refer to? A more

detailed explanation could have been given in «*5.3. Explanation of Statistical Indicators*».
• Tables 5.04 *Annual Living Energy Consumption* and 5.05 *Average Annual Living Energy Consumption per Capita:* Do these tables refer to household consumption? A more detailed explanation could have been given in «*5.3. Explanation of Statistical Indicators*».

• Table 5.06 *Major Material Resources and Consumption* seems somewhat misplaced in the energy chapter. This table would have been more relevant in a chapter concerning manufacturing industries and could have been expanded to include more materials.

Chapter 6. City Construction
• Table 6.06 *Basic Statistics on Gardens and Green Areas:* Green areas as a percentage of total urban area would have been interesting to include.
• More general: More emphasis could have been given to *key figures* (part of urban area, part of population connected to sewers, gas supply, etc.).
• Table 6.08 *Basic Statistics on Public Transportation:* What is the unit for the column «Taxis»?
• Data on urban air quality (level and trend) would have been relevant to include in a chapter on urban environment (see comment under chapter 7).

Chapter 7. State of Environmental Pollution
• This is a chapter presenting an overview of pollution or environmental impacts. As pointed out in paragraph 3.1. one could consider to split this into separate chapters.
• Table 7.01 *Basic Statistics on the Discharges of Waste Water:* The terms «pump» and «sexivalent» must be defined.
• Table 7.01 *Basic Statistics on the Discharges of Waste Water:* Is it possible to present a distribution by main industries?
• Table 7.02 *Quality of River Water* gives a very interesting general overview of water quality (quality classes) in selected rivers. Is it possible to present more information concerning water quality? This could for example include data for water quality (selected parameters) in selected rivers and lakes.
• Table 7.03 *Emissions of Waste Gas:* Total emissions (here presented in billion m^3) is a rather meaningless indicator. The mix of m^3 and tons in the same table should be avoided.
• Table 7.03 *Emissions of Waste Gas:* Is it possible to present a distribution by main industries?
• Table 7.03 *Emissions of Waste Gas:* It must be stated in a note to this table that emissions from important sources like transport (mobile combustion) and household heating are not included.
• Some information about the most important air emission sources in China should have been presented (in text or table).
• A table of CO_2 emissions from energy use would have been interesting to include in this chapter.
• Table 7.04 *Basic Statistics on City Atmosphere:* This table presents average values for different air pollution parameters in samples of cities. It would also have been interesting to include information (text, tables, graphs) on how the air pollution status has developed (time series) in selected cities, and also refer the measured values to air quality limit values.
• Table 7.05 *Basic Statistics on the Discharge of Industrial Solid Waste:* This table gives a good general overview, but it would be of great interest to include additional information concerning the composition of «industrial solid waste».
• Table 7.08 *Basic Statistics on Pollution Accidents:* The table presents an interesting overview of the number of accidents and also relevant information on the economic loss. It would also be of interest to present a more detailed description of the most serious of these accidents; what kind of substances where emitted and what were the consequences? It also would have been of interest to define what is included in the figures for «economic loss» (are for example clean-up expenditures included).
• Table 7.08 *Basic Statistics on Pollution Accidents:* What is the definition of «Noise pollution».
• Table 7.09 (1 and 2) *Basic Statistics on 10 Causes of Deaths and Death Rate:* That there is a connection between environmental pollution and health is not disputed. However, the direct causes of different health disorders (what environmental problem is the most important, what substance is the

most harmful, to what degree is change in life-style a cause) are much disputed. Perhaps it is best – for the time being – to leave such tables to health statistics? However, if there are results from for example specific projects on health effects of air pollution, etc., these could be presented as examples. Such projects could apply to selected cities or regions.

Chapter 8. Environmental Protection
• Table 8.04 *Basic Statistics on Environmental Protection System (1993):*It would have been interesting with a distribution of the number of environment monitoring stations according to type of monitoring (air, water, etc.)
• See other comments under 3.1.

Chapter 9. Marine Environment
• This chapter also includes information on «sea industry» and is not exclusive a description of the marine environment.
• Some information on basic environmental conditions of sea water could have been included. This could include more information on coastal waters and areas directly influenced by human activities.

Chronicle Events of Environmental Protection in China
This chapter gives a relevant general overview of events.
• One could also consider the inclusion of other themes (not only protection, but other events with relation to environment or resources).

4. Presentation

4.1. General comments concerning presentation and lay-out

Both structure, contents and the way the information is presented will be dependent on what kind of publication that is to be made (statistical compendium, state of the environment report, environmental indicator report, etc.), and on the main target groups (politicians, environmental management, media, schools, etc.) that have been decided for the report.

However, some important general aspects can be emphasised:

• The access to the contents of the report will be facilitated if relevant, well-arranged registers are developed:

- Contents
- Index of tables
- Index of figures
- Catchword index
- Index of abbreviations (for example institutions), chemical formulas, etc.
- References (bibliography)

These registers can, with the exception of *Contents* and to some degree *Index of figures* and *Index of tables*, be placed in the rear parts of the report. If the indexes of tables and figures are very long, they can also with advantage be placed in the rear parts (so that the introductory parts of the report are not too overwhelming or difficult accessible for the readers).

• Definitions of terms, detailed explanations, etc. can be presented in a *Technical Annex.*
- In the report *Environment Statistics in China,* the paragraphs *Explanation of Major Statistical Indicators* that now are presented at the end of each chapter (and are very useful),

could instead have been presented collectively in such a technical annex.

• Use of graphs and maps can to a considerable degree ease the readers access to the information that one wishes to present. Trends are more easily detected, and regional dimensions or differences are more easily presented.

- In the report *Environment Statistics in China* no maps or graphs are used, and one should consider more use of these communication or presentation tools when further developing environment statistics reports (see examples in 4.2). The improvement of computer technology and available software in the institutions since the preparation of the current report should facilitate this task.

• Concerning units: in the tables of the report 10 000 hectares, 10 000 mu, 10 000 tons, etc. (that is 10^{-4} is frequently used. There may be a tradition for this that we are not aware of, but units of 10^{-3} and 10^{-6} (thousands and millions) should be considered.

• It is important to include analyses or comments to the data that are presented in the tables. Such comments should focus on reasons for observed changes in emissions or environmental conditions. It is also considered to be of importance not to include too many figures (numbers) in the texts. This will only make the texts more complicated and less interesting to the reader; place the figures in the tables, concentrate on explanations and comments in the text.

- As an example, consider the table 7.03 *Emissions of Waste Gases* (page 56 of *Environment Statistics in China).* By studying this table one can observe that there has been a considerable reduction in the emissions of sulphur dioxide (SO_2) in China from 1992 to 1993. There is no text giving any explanation of the causes for this reduction.

• Long, complicated and extensive tables could, with advantage, be presented in an Appendix.

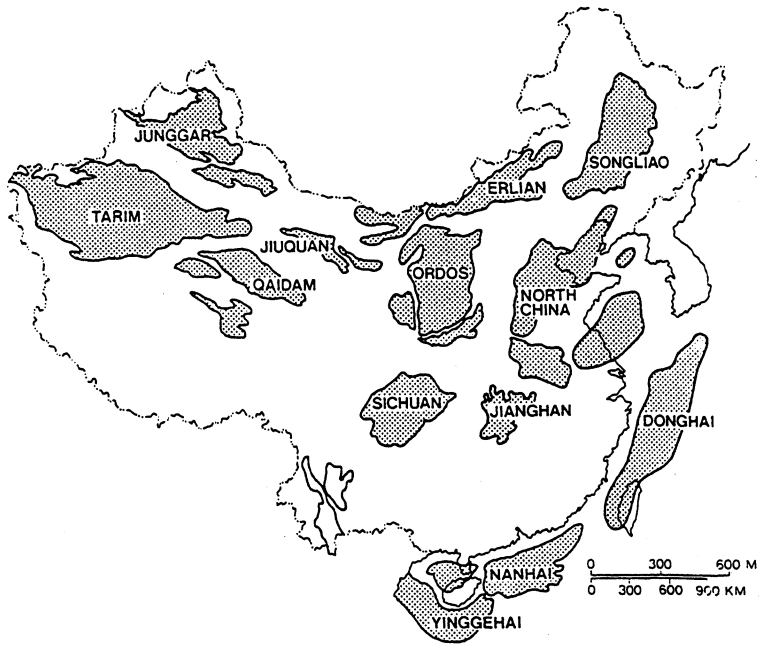
- There are no good examples of this in the present report, but it should be kept in mind in future work.

• All tables and graphics should include references to data sources.

4.2. Examples of graphic presentations

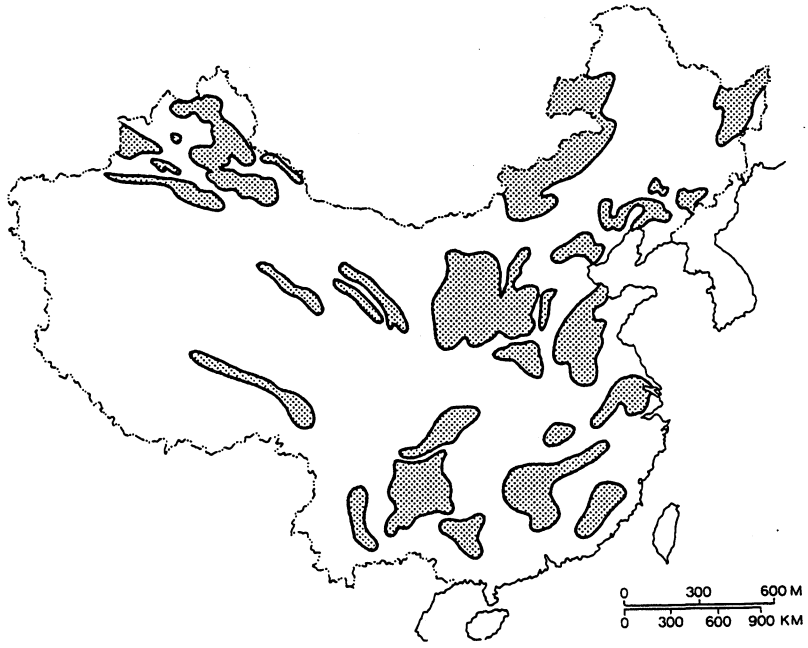
In this paragraph a few examples of maps or graphs that one could consider to include in an environment statistics publication are presented. The examples are related to the topic energy or energy use.

China's principal hydrocarbon basins



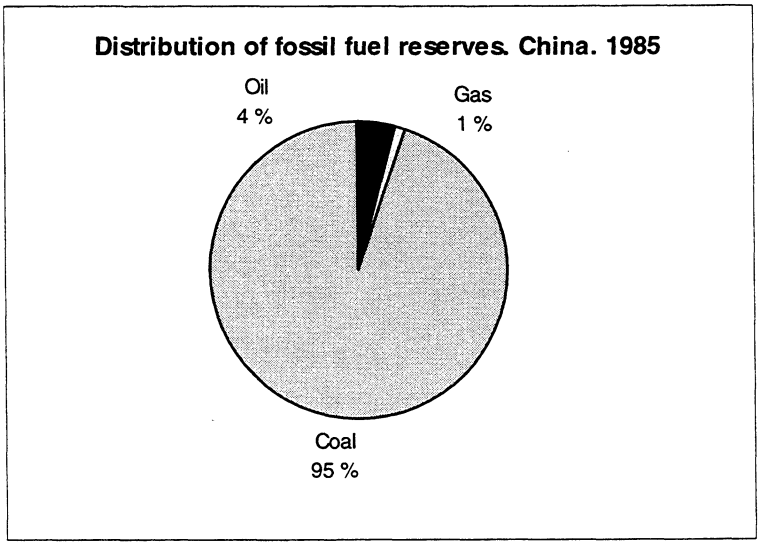
Source: Smil 1988

Distribution of coal-bearing sediments in China



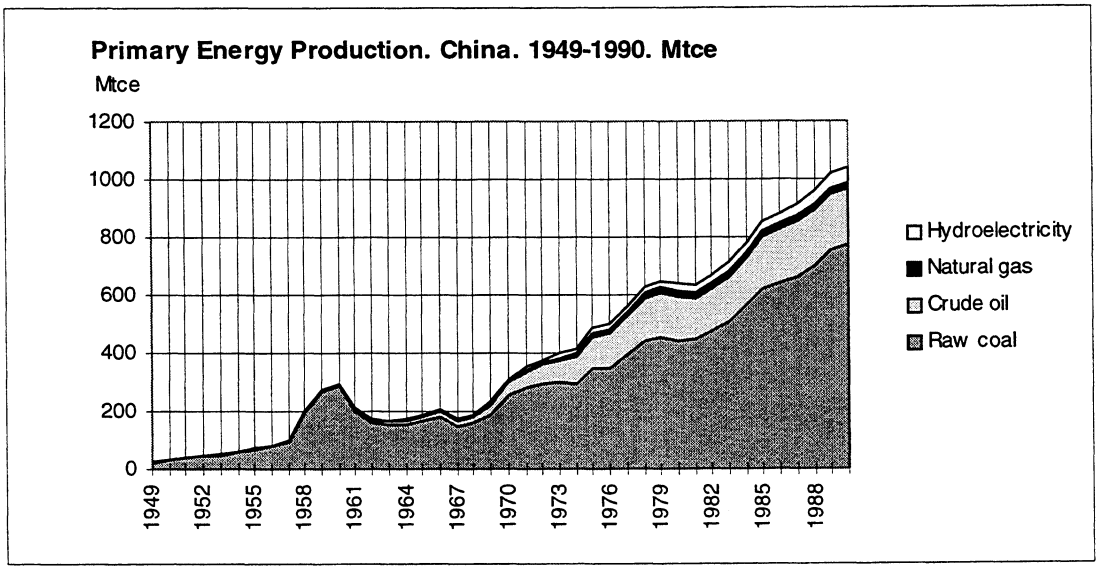
Source: Smil 1988

Fossil fuel reserves in China

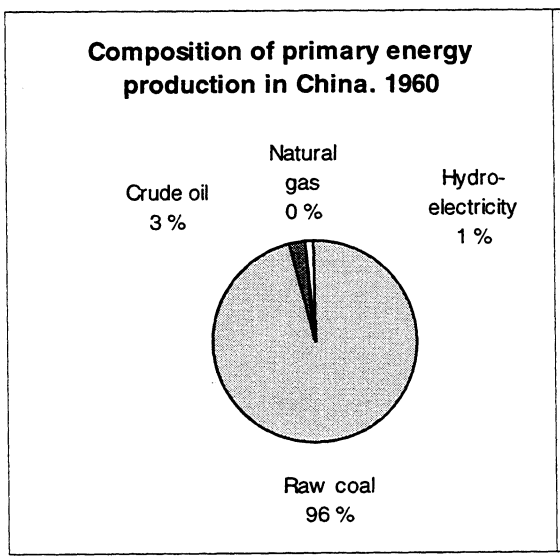


Source: Smil 1988

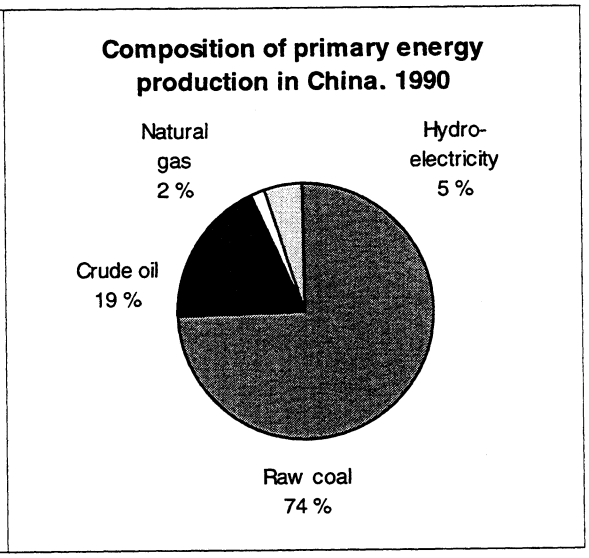
Primary energy production in China



Source: Sinton 1992 (China Energy Databook)

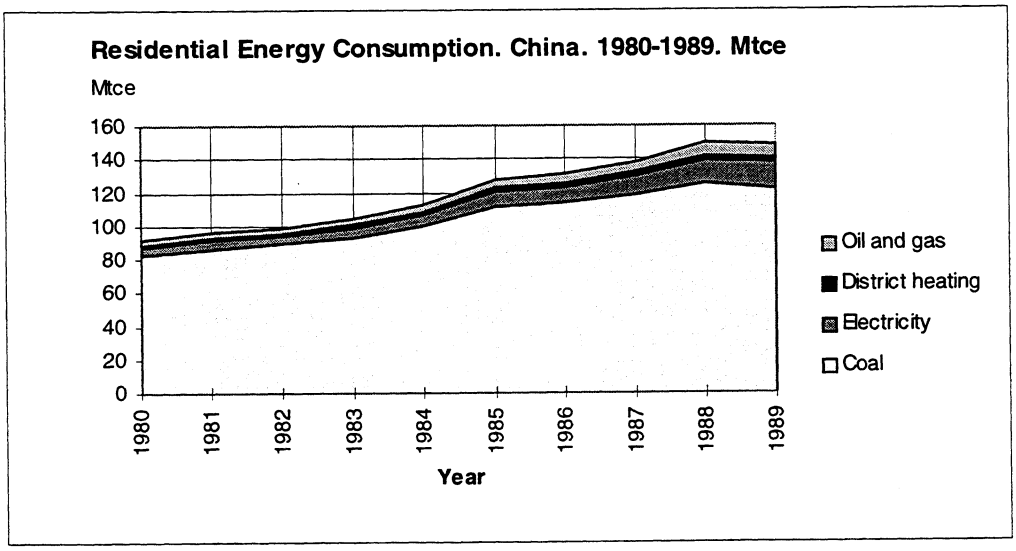


Source: Sinton 1992 (China Energy Databook)

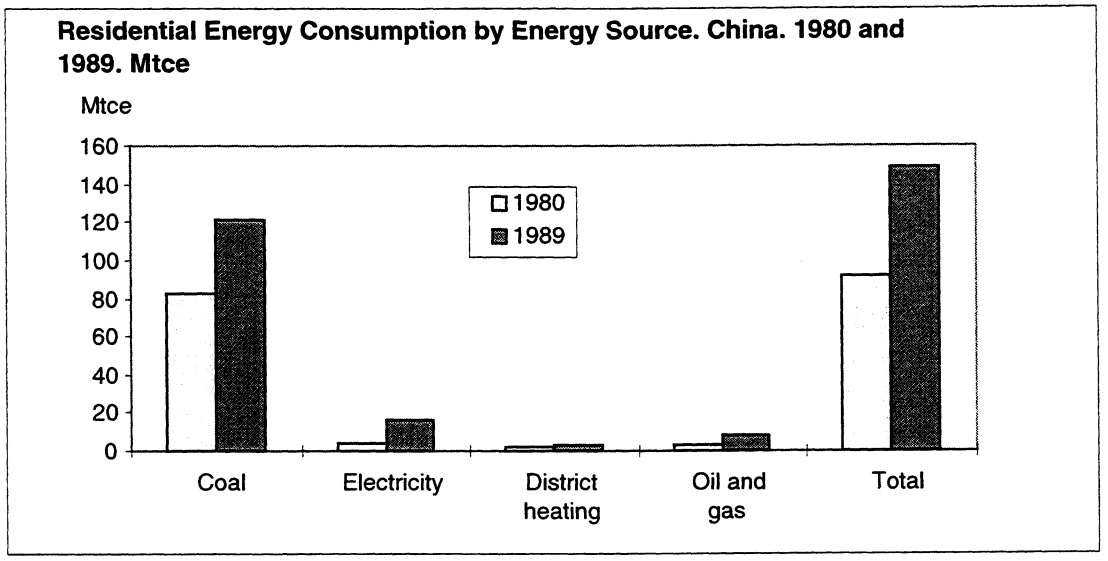


Source: Sinton 1992 (China Energy Databook)

Residential energy consumption by energy source

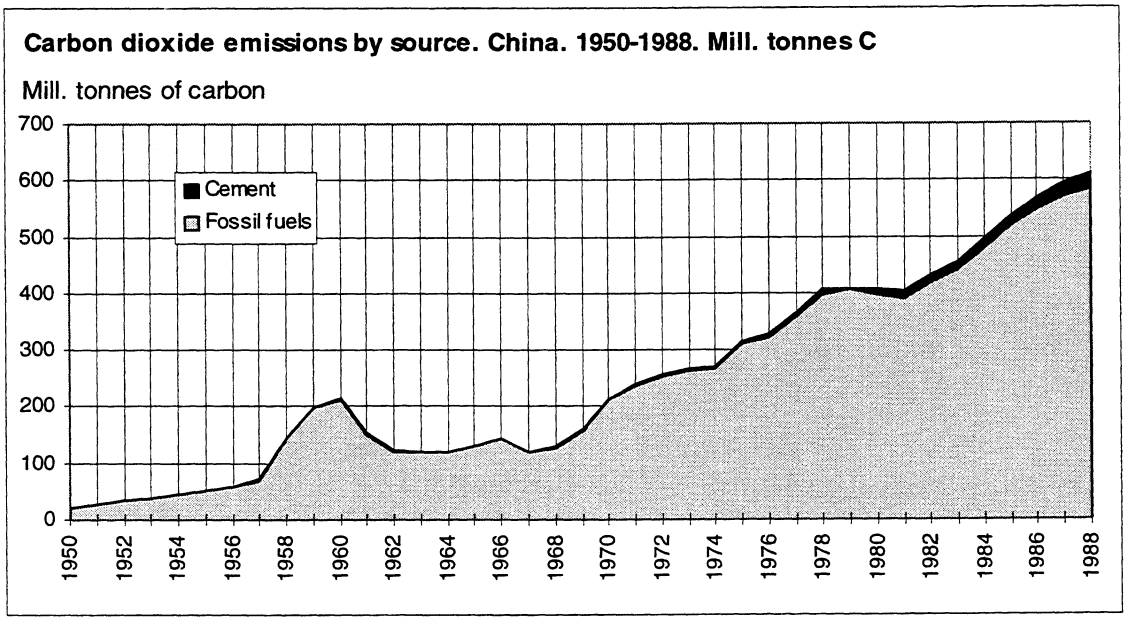


Source: Sinton 1992 (China Energy Databook)



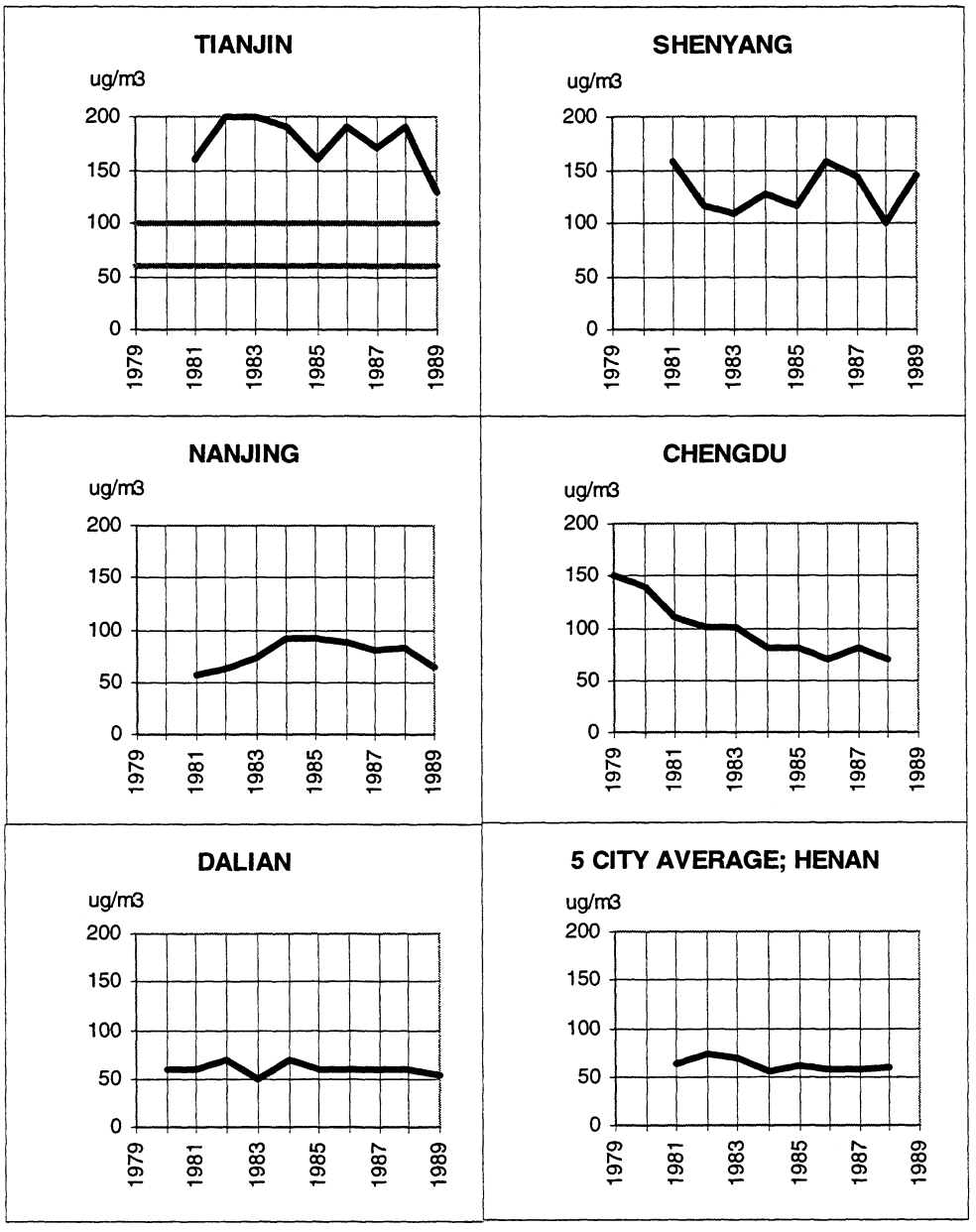
Source: Sinton 1992 (China Energy Databook)

CO_2- emissions in China



Source: Sinton 1992 (China Energy Databook)

Sulphur dioxide (SO_2) concentration in selected cities



Source: Sinton 1992 (China Energy Databook)

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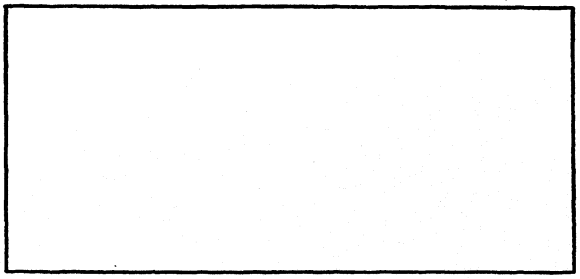

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