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Forward Looking

Structural change and institutions in highest-income countries and globally

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Abstract

Purpose – Structural economic shifts are a key sign of development in all stages globally; and these shifts may also result in the changing roles of institutions. The purpose of this paper is to quantitatively analyse trends that may be used for so-called forward looking and makes use of them to recommend strategies for reorganising institutions.

Design/methodology/approach – The requirements and opportunities of environmental administrations in high-income countries are used as case studies to illustrate the overall context of institutional restructuring. Luxembourg, as a present-day centre of political and strategic power within the European Union and Austria, as a neutral country formerly situated between military blocks are shown to exhibit structural and strategic similarities.

Findings – Two types of quantitative assessments may support any type of institutional restructuring: first, analyses of mega-trends within the global techno-socio-economic evolution and second, options for specific action at the local site of previously industrial settlements that may be converted into centres of innovative service orientation.

Practical implications – On the occasion of the recent resettlement of the Luxembourg Environmental Administration at a new site in Esch-sur-Alzette – in an area of bolder modern urbanisation built on the foundations of the former local industrial use considered – this text deliberates options to propose strategically pioneering innovations on administrative levels.

Originality/value – The paper combines global analyses and local experiences in an action-oriented manner.

Keywords Institutional change, Austria, Global megatrends, High-income countries, Luxembourg, Reorganization, Administration

Paper type Research paper

1. Introduction

Any attempt to reorganise institutions poses questions about how best to perform such restructuring tasks, given the long-term prevalence of institutional patterns.

Quality criteria for dynamic, transdisciplinary reorganisation processes (Hardaker, 1998, 2006; Ahamer, 2014; Ahamer and Kumpfmüller, 2014) are more difficult to find than they are for traditional tasks of reorganisation (e.g. Miller, 1992).

This paper uses two case studies of environmental administrations in European high-income countries to discuss prerequisites for optimally finding answers to structural necessities on a general and global level. When reorganising itself, any (environmental) institution could pose itself the following questions in order to evaluate its structural appropriateness and societal efficacy (cf. Gira, 2011):

- to consider all three pillars of sustainability, namely creating a balance between environmental, economic and social interests;
- ensure proactive information supply to the public;
- assess the key role of the actor in the integration of environmental and sustainability interests with economic interests to ensure their efficient and modern structure;

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- a more active role for an administration not only serves environmental interests but also economic interests;
- recognise energy policy and climate protection as essential challenges;
- transformation of the self-perception as an advisory institution in the service of both the environment and the economy; also more efficient operation of the institution; and
- the institution must comply with the requirements and obligations of EU policy.

The mentioned requirements inside the European Union may be illustrated by the subject areas of the sections used in the EU environmental legislation collection *Handbook for Implementation of EU Environmental Legislation* (EC, 2008). Figure 1 quantifies their amount by the number of pages.

2. "Forward looking" means to account for global megatrends (GMTs)

The term "forward looking" is among others used in the European Environment Agency's (EEA) regular exercise to assess GMTs within their "State of the Environment Reports" (SOER), officially entitled "The European environment – state and outlook" and appearing every five years; the next report is scheduled for 2015. In this framework the EEA has defined the programme "Knowledge base for Forward-Looking Information and Services" (FLIS, 2011) including a communication-oriented exchange platform between member states' administrations.

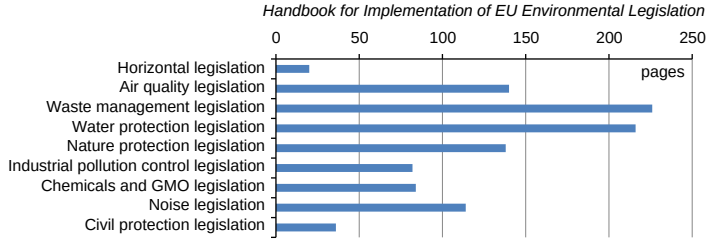
One of the tasks of forward-looking activities is to detect and assess GMTs and their relevance for own strategic decisions.

2.1 Historical transitions

The technical access in the environmental sector has evolved from a focus on environmental media and natural assets (such as air, waste, water, nature) to processes and functionalities.

The fundamental paradigm of action in the environmental sector has changed in recent decades from a reactive to a proactive stance. Language has changed from "environmental protection" to "eco-design" within the definition of the new integrative paradigm of sustainability that seeks to balance ecological and economic arguments with the goal of sustainability.

The fundamental understanding of the roles of institutions in the environmental sector has therefore changed from controlling to consultative. Existing problems can be perceived as a common task in which project applicants, state authorities and



Source: Regional Environmental Center (2008)

Figure 1.
Organisation of chapters in the *Handbook for Implementation of EU Environmental Legislation*

participating citizens together face a topic that is expected to be resolved jointly, including the definition of its criteria for success. Such situations are no longer understood as a hostile situation in which stakeholders act while perceiving each other as opponents.

The new question would therefore be: how can the actors design environmentally responsible processes? The old question may have been: how can the authorities optimally monitor and control the players as well as their observance of rules and regulations? As examples, shifts in state institutions and within democratic society have been described by Grinin (2012) and Aschemann (2004, 2005).

Global long-term trends of techno-socio-economic development determine the fields of forces and landscapes of interest, as well as the economic pressure on environmental media and the common goods which need to be protected. The postulated causal relationship corresponds to that applied in the EU concept DPSIR (drivers – pressures – state – impact – response: EEA, 1997, p. 4; Pirrone *et al.*, 2005). Therefore, it is appropriate to refine globally valid trends with a view to the location of Luxembourg and to analyse their environmental relevance. This is summarised in Figure 2 as a function of GDP/capita.

In accordance with classical theories of economic development (Farmer and Vlk, 2011), the importance of the first or agricultural sector (green in Figure 2) in developed countries (as currently includes Luxemburg with the highest GDP/capita worldwide, see IMF, 2013) in its contribution to the total value added is constantly decreasing. In the long term this effect is very likely to reduce pressure on areas for food production; this means that usage of agricultural areas is reduced; a widely known process in agricultural structural change (Ahamer, 1997). Such areas are now used for a new "construction of meaning" (Ahamer, 2012, especially in tourism and the well-being sector (the third and fourth sectors, Ahamer, 1994)).

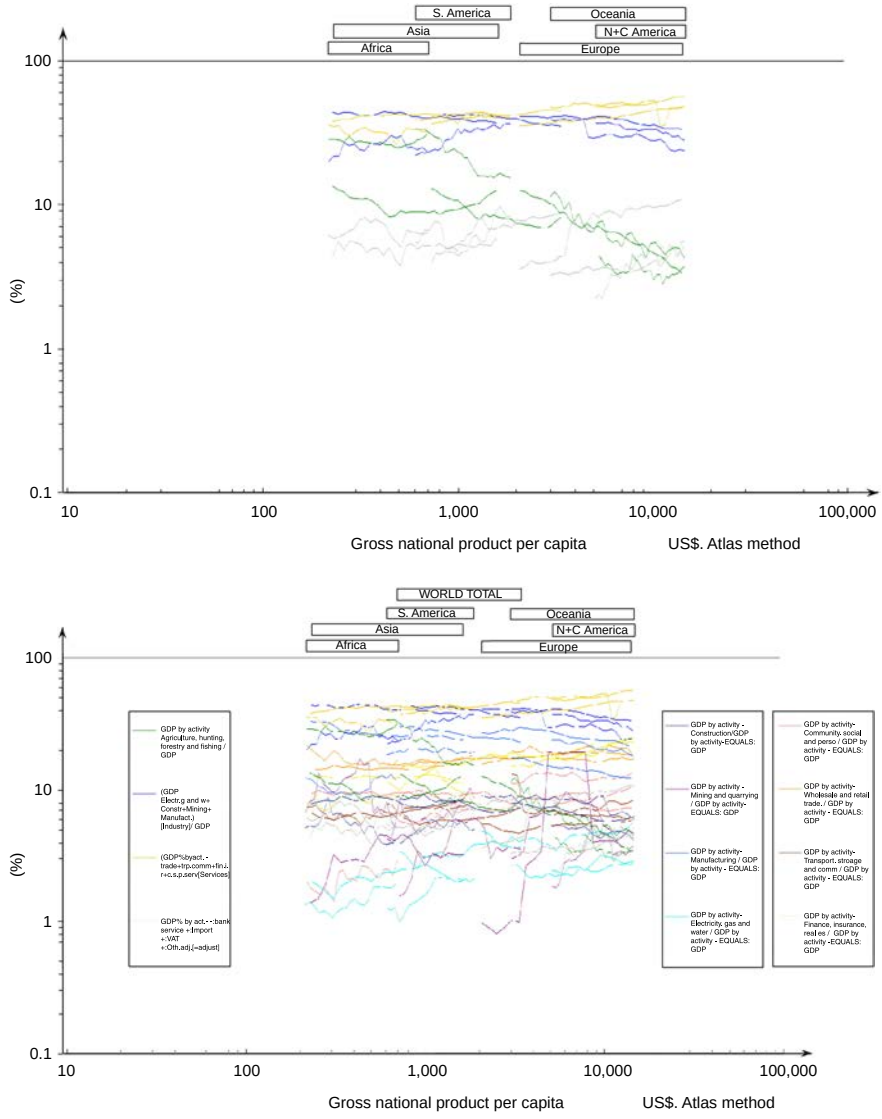
Although the contribution of the second, i.e. industrial sector (blue in Figure 2) is still rising in other parts of the world, it has already started dropping significantly in the post-industrial society of Luxembourg, as the picturesque, abandoned industrial ruins in the so-called red-lands area of the "terres rouges" district in the south of Luxembourg clearly demonstrate (industrial restructuring). These are now used as a founding place for service companies (yellow in Figure 2). Indeed, the urbanisation in recent years of the blast furnace coalfield of Delval in Esch-sur-Alzette, in which the Luxembourg Environmental Administration (AEL) has based its new headquarters, is particularly notable.

In many respects Luxembourg may be regarded as a "pioneer of *economic transitions*"; this is a strategic role that may generate expertise in environmental transitions.

The historical curve is on the one hand an autopoietic, evolutionary trend due to economic self-regulation; on the other hand it is the result of conscious control such as so-called "political action". The second is usually regarded as a departure from the former, called the trend (business-as-usual scenario). A trend equivalent to still-continuing momentum of change is tentatively shown in Figure 3, namely, a further expansion of the service sector in particular (yellow).

2.2 Global trends that affect environmental administrations

For each potential subject area within environmental protection there are dynamic developments that can provide clues to future shifts in significance. For this target some of the "GMTs" can be analysed by means the author's Global Change Data Base; namely the display of 18 environmental issues as time series. Its main results are as follows (environmental pressure rises sharply ↗↗, increases ↗, remains constant →, decreases ↘, decreases sharply ↘↘).



Notes: Trends are shown for all "continents" of the Earth (below) during the three decades 1960-1991 as a function of the level of economic GDP/capita according to the "Global Change Data Base" GCDB (© G. Ahamer) in three main sectors (top) and in ten sectors (below). Green = agricultural sector, blueish = industrial sectors, yellowish = service sectors. Technically, these figures have been produced by stretching the timelines of the variables across the GDP/cap interval on the horizontal axis for the continents labelled above

Figure 2.
Shares of single individual economic sectors as a percentage of the total economic product: synopsis of relevant global trends that dynamically characterise the "landscape of topics"

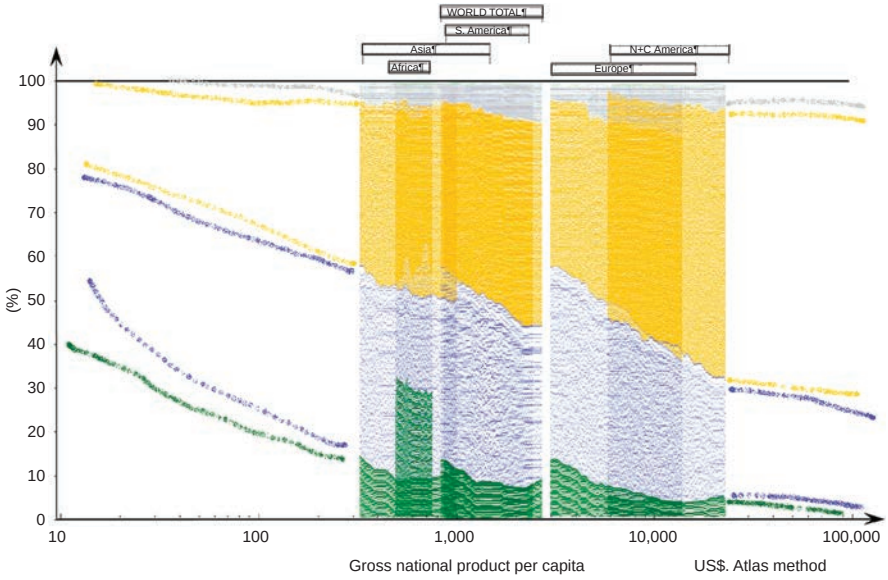


Figure 3.
Shares of the three main economic sectors as a percentage of the total economic product: the line graph of Figure 2 is displayed in the form of an area plot vividly showing the structural shift "first → second → third sector"

Notes: A continuation of the global trends, especially a further decline in agriculture (green) and an increase of services (yellow) in their respective share of total value added can be assumed as a first approximation (business-as-usual scenario)

1	Waste, waste management and old waste	↗↗
2	Soil	↗
3	Chemicals and biocides and pollutants	↗↗
4	Energy	↗
5	Genetic technology and genetic engineering biosafety	↗↗
6	Integrated industrial technology	→
7	Climate protection	↗↗
8	Agriculture	↗
9	Noise	↗
10	Emissions and air hygiene	↗
11	Sustainability	↗
12	Nature conservation	↗
13	Spatial planning and regional planning	↗
14	Radiation protection and nuclear energy	→
15	Environmental Impact Assessment and Env. Information Act	→
16	Traffic	↗↗
17	Forest	→
18	Water	↗↗

Seen from the presumed development of environmental pressures, the importance of issues such as climate change should increase, in particular the driving factor of rapidly increasing traffic, as well as chemical and biological safety issues.

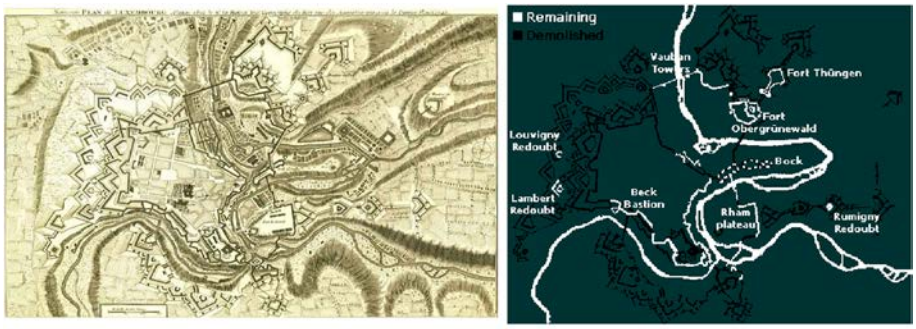
3. The case of Luxembourg: structural shifts in institutions and economics

In the nineteenth century, Luxembourg has acquired "neutrality" between competing military powers and cultures and mastered to preserve both their perceptions of values – due to its geopolitical position between two historical forces (Germany and France) and driven both by its smallness as decided by active political action.

This "dividend of peace" was reflected by free city areas on the location of former city fortifications (Plate 1). This led to increased confidence that could be gained in the perception of the former rivals. Such a role model of conflict-free solution finding, in turn, allowed the positioning of institutions in Luxembourg a century later which implemented the search for conflict-free solutions in a much wider geographical area, namely the European Union. With respect to its neutral positioning between strategic blocks, the political story of Luxembourg in the nineteenth century was similar to that of Austria in the twentieth century.

The following idea offers itself as an analogy: Luxembourg's existing pioneer-like knowledge of how to design solutions in the economic domain could also bear long-term fruit in the environmental domain. In particular, the restructuring of a pronounced industry-oriented economy into a pronounced service-oriented economy appears to be one of Luxembourg's strengths.

Luxembourg possesses a symbolic city map: the Kirchberg plateau at the eastern outskirts of the city of Luxembourg, with its numerous international organisation buildings, begins at the site of "Fort Trois Glands" (in German: Fort Thüngen), see Plate 1 at right, and Plate 2 at left.



Source: Goode (2008)

Plate 1.
At left: Luxemburg 1740, with the Austrian additions to fortifications by Vauban, at right: Luxembourg has removed almost all its fortifications (black), keeping only a few (white)

Source: First author's photos and Bourrichon (2009)

Plate 2.
At left: the historic Fort Trois Glands on Kirchberg, centre: modern Luxemburg-Kirchberg, at right: the siting of European institutions follows the historically sensible German-French tectonic breakline and includes therefore also Luxembourg

The dissolution of material military structures in the nineteenth century (resulting in considerable peace dividends) is presently being followed by the dissolution of material industrial structures, notably in the district of Belval in Esch-sur-Alzette. The energy-intensive former steel industry, symbolized by the remarkable signs of blast furnaces in Belval (at left) is used only as an urban scene by a ring of administrative buildings pertaining to the service sector, the banking sector and also to a science city (Plate 2 at centre and at right).

Similarly to how historical value is culturally seen in the restoration of dilapidated castles, the furnaces have been repainted in Belval (Plate 2).

This place has been claimed by banks (Plate 4) and a *Cité des Sciences* (science city, Plate 3), including a library. The urban planning process of Esch-sur-Alzette/Belval "targets to where it aims" (tu tires ou tu pointes, Plate 4 at centre), namely to the restructuring process in the region. The environmental administration overlooks such architectural restructuring from their windows in their new headquarters on the ring road of Belval (Plate 4 at centre).

Based on above experiences, a pioneering role for Luxembourg would be suitable insofar as Luxemburg can provide the experience of a transition from an industrial structure to a service structure even on a supranational level and thus promote future-oriented structural and environmental policies.

Another pioneering role would be to provide the experience of a transition from a conflict-based to a conflict-free interplay of stakeholders, elevated to a supranational level.

4. Considering additional organisational principles

4.1 Structuring topics in three dimensions

Before structuring an environmental administration, considering the structure of their subjects is essential. How should one structure the thematic variety of environmental issues, which basically arises in any environmental administration?:

- best to follow the DPSIR approach from which there exists EU-wide consensus;
- here reduced for the sake of simple representability D→S→R (three-dimensional);

Plate 3.
The industrial age in Belval

Notes: At left: Blast furnaces are reflected in unused administration buildings. Centre: Circular road in Belval around blast furnaces (hauts-fourneaux, blue on the board). At right: Re-paint blast furnaces act as a scenery for a new science city (cité des sciences)

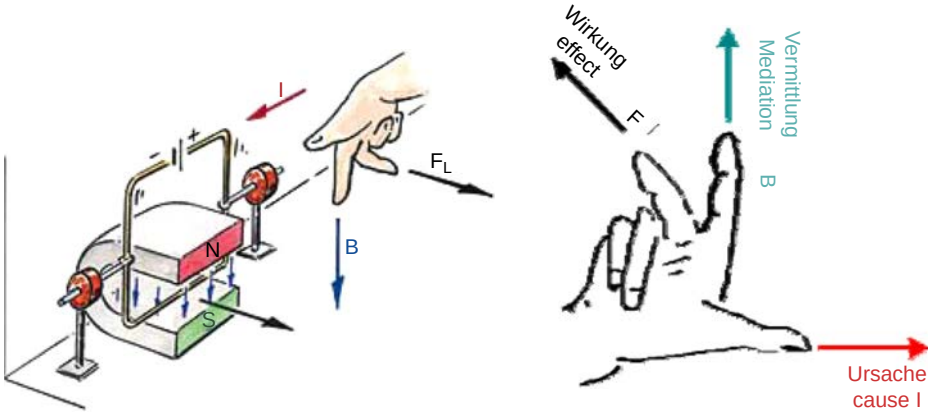
Notes: At left: bank buildings are reflected in the mall's windows. At centre: "You shoot where you aim". At right: the environmental administration building in Esch-sur-Alzette/ Belval: "The imaginative is the guardian of our roots"

Plate 4.
The service age at Belval

- according to the logical sequence of UVW in German (= Ursache, cause → Vermittlung, mediation → Wirkung, effect); and
- takes its inspiration from the right-hand rule or UVW rule for an electric motor (Figure 4).

These entities (D, S, R) are proposed as follows:

(1) D: human drivers = human need (corresponding sector with respective sectoral GDP/capita), as follows:
   - food = agriculture;
   - exchange = trading;
   - fetch raw materials = mining;
   - produce goods = commerce and industry;



Source: Leitner and Finckh (2008)

Figure 4.
The 3-finger rule or UVW rule succinctly explains the spatial directions occurring in a simple electric motor

- secured living = construction;
- create local ranges = transport and communication;
- build physical infrastructure = water, gas, electricity;
- protect human (social) structures = community and social services; and
- optimise efficiency = financial and insurance.

(2) S: nature's states ≈ environmental media (materially convey this activity, in them it goes on, as an environmental media they have an integrator function, i.e. they cumulate the effects):

- soil (where set and planted) – the "lying/standing element";
- water (which supplies and is disposed of) – the "floating element";
- fire = energy (by which heated and driven) – the "energy-giving element";
- air (by which surrounded and connected) – the "volatile element" (including noise and radiation); and
- living things (to where life aims) – the sense or quintessence (*quinta essentia* = the fifth essence) – the element giving meaning.

(3) R: human responses = counter-strategies (equivalent to tools, approaches, policy):

- occasional individual actions (technically or legally) = e.g. decisions regarding filters;
- equilibrate between different claims or targets, e.g. technology assessment or EIA decisions, static thinking of technological state-of-art; and
- systems analysis = impress rules of action such as emissions trading, sustainability strategy; already dynamic, self-optimising control loops generate foresight (systems theory).

Now one can outline these three dimensions as a drawing (Figure 5).

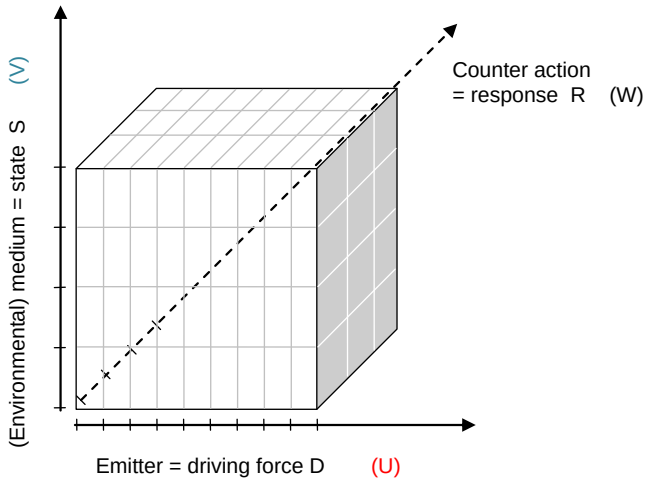


Figure 5.
The three-dimensional cube of an idealised classification of the departments of an environmental institution

One might assume theoretically that the entire field of environment protection can be represented by three sections (Figure 6). However, it is unrealistic to break down the divisional structure of an environmental institution purely by either:

- only the emitter or;
- only environmental media or;
- only types of measures.

because the necessary (interdisciplinary) interactions would thus be largely lost and one ends up with a purely disciplinary worldview.

This structure is displayed in as general a way as possible and the departmental names of an environmental administration fit into it only if combined approaches are used.

4.2 The node may be in three dimensions

There are three types of selection principles of structure for both environmental issues as well as environmental administrations: each of the three dimensions mentioned above represents the principle of classification, and the two depend on each other.

These are determined by the areas in which the "logical node" in question lies. There may exist topics (and thus AEL departments) that are oriented to emitters (e.g. traffic, industry), to environmental media (e.g. soil, water, air) or specifically to a strategy (e.g. sustainability-oriented) and thus contribute to a systemic approach.

To follow only one of these three structural principles for environmental matters (Figure 6), though theoretically possible, is not an optimally skilled approach with regard to practical and administrative procedures:

- Emitter-specific (= source-specific) topics: all emissions from a group of emitters, regardless of the environmental media. Examples: industry, transport, agriculture (Figure 7, compare Figure 6 at right).
- Topics specific to environmental media: all processes in a given environmental medium, regardless of the group of emitters and response strategy with which it is encountered. Examples: soil, air, water (noise, radiation protection). (Figure 8, compare Figure 6 at left.).

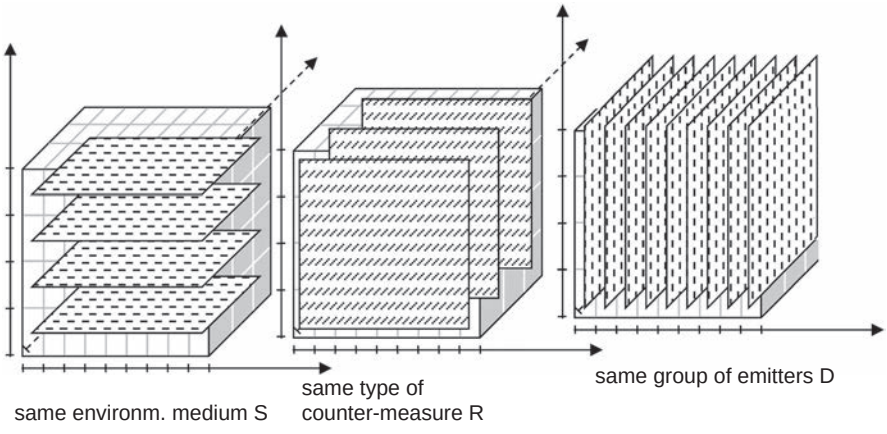


Figure 6.
Only fictional possibility of an idealised classification of the entire subject area "environmental protection"

- Strategy-specific themes: a specific strategy to remedy the situation, no matter which environmental medium or group of emitter the pressure is derived from. Examples: punctual action in individual cases, consideration of different aspects like EIA, forward-looking system design for a self-regulating, self-optimising system such as emissions trading. (Figure 9, compare Figure 6 centre.).

4.3 Breakdown according to maturation degrees of themes

Beyond this categorisation, it is also possible that another classification structure will make sense, namely, according to the degree of crystallisation of a theme:

(1) First we see a diffuse question which has not yet developed its own identity and stems from analogies with other areas.

(2) Then an identity emerges, methodologies are developed, departments, meetings and conferences carry this name.

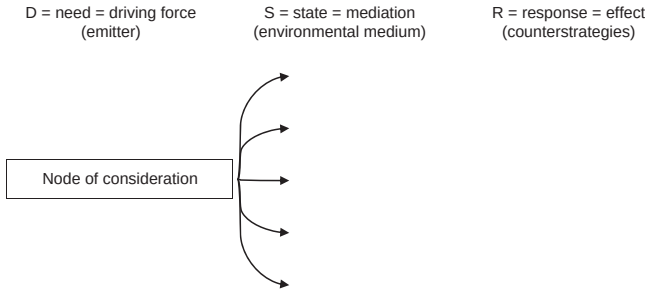


Figure 7.
An emission sector affects many environmental media and does not specify a specific category of counter-action

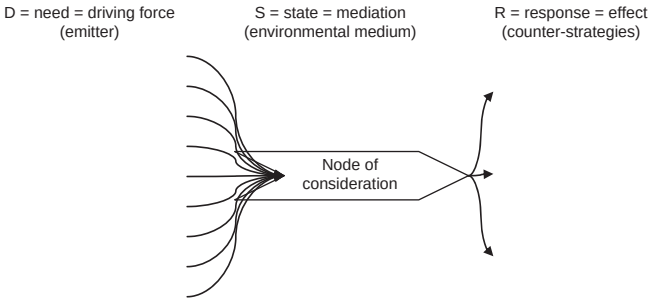


Figure 8.
An environmental medium is influenced by emitters from many different sectors and allows different categories of counter-action

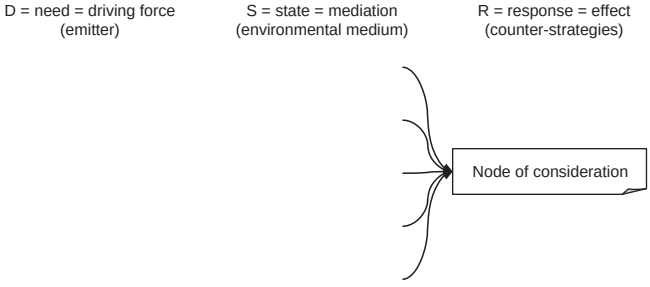


Figure 9.
A specific category of counter-action involves several environmental media

(3) General recognition of the theme's main statements and procedures, the reporting of requirements and monitoring begins.

(4) The last step is the standardisation of topics (petrification of thought), standardisation of calculation methods, reporting requirements directive: "You, my dear EU reporting requirements are petros ($\pi\varepsilon\tau\rho o\varsigma =$ rock) and on you I will build my environmental administration". The theme is manageable by an engineering approach and possibly serves as an attraction for other, not yet differentiated questions that are in earlier stages.

This genesis of issues is symbolised by the astronomical life cycle of matter in the following rough steps in the formation of a solar system, during which centripetal forces grow (Figure 10):

(1) intergalactic dust with no apparent centre of gravity;

(2) spiral nebula with incipient rotation around an emerging centre;

(3) celestial bodies with clearly defined shapes are created; and

(4) depending on its mass and temperature, the body can shine and capture planets or moons.

The impact of this model of thought on economic and corporate governance seems clear: a balanced organisational structure should offer a balanced portfolio of both young and old subjects (Figure 11). Obviously the old themes play the role of a stabilising structure

Figure 10.
Long-term genesis of environmental issues and consequently of departments

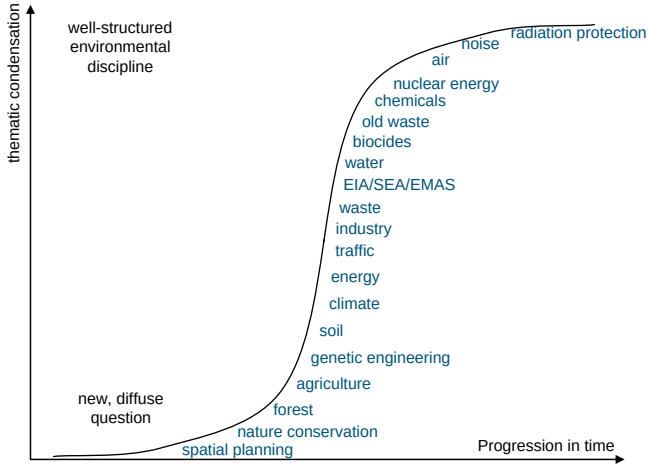


Figure 11.
Some potential environmental issues using the example of the themes of the Environment Agency Austria, tentatively lined up along the theme genesis of the "new, diffuse question" (left) to "discipline through structured environment" (right)

(or in the case of the private sector, orientation and a cash cow), which can attract and sustain economically younger subjects. The wise racing enterprise has enough horses with different dynamic profiles in the stable: Haflinger and Arab.

This consideration is therefore employed here, because otherwise one might believe that the economic and thematic positioning of an administrative structure would be mainly due to personality (even if this is partly true). The potential economic return at a higher degree of petrification of a theme, however, is basically higher.

5. Treatment of examples for environmental issues

This chapter considers how (on the basis of the above considerations) the complexity of environmental issues can be presented.

The above chapter was about which of three items should take the nodes function: either an environmental medium (S), a group of emitters (D) or a type of measures (R). In practice, the topics or even the department designation cannot usually be completely reformed or pressed into a scheme. These mentioned three approaches mean the envisaging of the entire issue from an ever changing point of view.

Here one example for individual topics of environmental protection is dealt with using the example of the Environment Agency Austria. Analyses of other topics will be publisher later. Data available from the GCDB (covering all countries of the world) is used sparingly in the following section to allow for quantitative statements (mostly in representations depending on the economic level of GDP/capita, as time series over three decades of as many countries of the world as data are available for).

5.1 Waste, waste management and old waste

5.1.1 Position with respect to D→S→R. The selection of topic is emission related (action related) and refers to a type of emission (Figure 12). Waste is the result (mostly solid state matter) of almost all type of economic activity, thus the main directions of action are as follows.

5.1.2 GMTs. Several graphs follow in Figure 13; the data situation is generally very low regarding waste but shows consistently increasing trends in OECD countries.

5.1.3 Results and recommendations. Soil is one of the most patient integrators of environmental influences: it collects, for example, waste.

Although the material intensity of the economy may have already decreased, the resulting materials still continue to rise significantly due to overall economic growth. According to the trinity in waste policy "avoid – recycle – utilise", the door is open to a systemic approach. Strategically, waste is a very nice area of environmental protection in which (according to the national distribution of competences) a fundamental educational approach can be developed with the joint involvement of industry: self-optimising

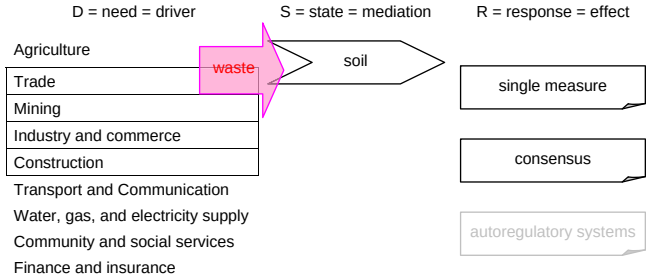


Figure 12.
Structure of the waste theme with respect to D, S, R

boundary conditions resulting in waste prevention. If that were possible, it would be a success and a learning example for other – perhaps systemically even more complex – environmental areas.

5.2 Soil conservation

The selection of topic is related to environmental media (Figure 14); soil collects from almost all emitters.

5.2.1 Position with respect to D→S→R. See Figure 14.

5.2.2 GMTs. From Figure 15 and Figure 16 it can be concluded that:

(1) In developed countries the amount of "arable land" has already shrunk, but in less developed it is still rising.

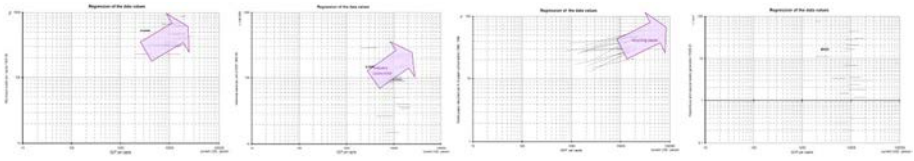
(2) This reduction of "arable land" in highly developed countries will possibly transform into a slight increase.

(3) In all countries, the parameter of "arable land per capita" will soon be shrinking.

(4) All these developments are obviously driven by the strong increase in efficiency of agriculture as such.

(5) At least the classic (Malthusian) observation, "the earth could feed humanity only scarcely", is soon also likely to lose relevance in the less developed states and that therefore "pressure is taken from the arable land" and additionally "farmland no more represents a bottleneck function for the nutrition situation"; however, for ultimately clarifying such interpretations a more detailed study of the data is necessary.

(6) At least as far as Central Europe is concerned, the present trend constellation with the reinforced dawning of high quality (i.e. organic) agriculture would be fully compatible, because first sufficient land is available, and on the other hand (see GDP data on agriculture) the decline of the agricultural GDP share seems to save itself (i.e. will not decrease further). Additional reinforcement of



Source: The first author's GCDB (Ahamer, 2001)

Figure 13.
At far left: Municipal waste per capita 1985-89, in kg, for OEDC countries (thick line: OECD average), at near left: Industrial waste per unit of GDP 1985-89, in t/million US$ (circles: OECD sum), at near right: Waste paper recycled (as per cent of paper consumption) 1965, 1988, in per cent, at far right: Hazardous and special waste generation 1980-87, t/km^2

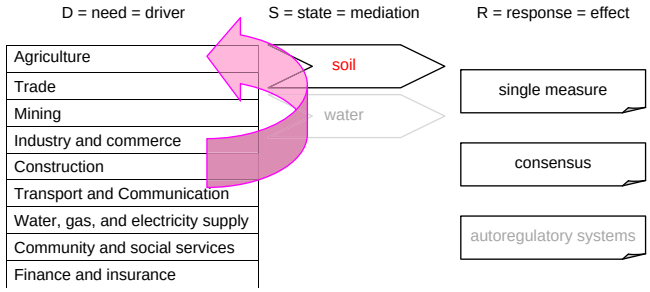


Figure 14.
Structure of the soil theme with respect to D, S, R

organic farming in Central Europe would in this light be no "statistical outlier" an individual "atypical" country (e.g. Austria, where organic farming has been built on a broad national consensus for decades), but would be well situated even in the emerging GMT.

(7) In any case: set-aside areas are fully in the global trend.

5.2.3 Results and recommendations. A preliminary assessment could state that quality-oriented agricultural production is basically in line with the global trend. In other words, the agricultural value added would not decrease as a result of decreasing land utilisation per capita. The resulting gap "food amount versus food value" can apparently be bypassed by increased food value per food unit.

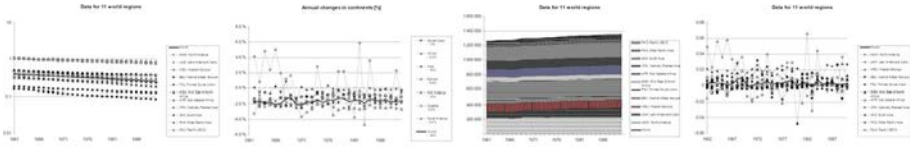
5.3 Challenges and opportunities for environmental administrations

The observations and trend analysis performed for the themes of waste and soil suggest the following basic approaches:

- To understand upcoming developments and shifting of targets (Ahamer, 2008) as being generated organically out of each other as a result of structurally evolving phenomena (blossoming evolution).
- To anticipate up-coming values (if possible, e.g. move towards a society of meaning) and benefit from freed potentials resulting from productivity redundancies (anticipation is a learning effect resulting from forward-looking).
- To use those forces (arising from the techno-socio-economic evolution of civilisation) as auxiliary drivers for the goal of sustainability (e.g. user-friendly energy systems, de-materialisation of industrial production, new communication technologies and web platforms, etc.).
- The task of environmental protection is becoming increasingly structural. The simple successes have been harvested; the cross-linked tasks (transport, spatial planning and sustainability) still lie on the work desk. For this, a technically sound and long-term dialogue system between various professional groups and advocacy support is needed.

In light of the above example, a test paragraph for a new mission statement of an environmental administration could be:

> The environmental administration accompanies the state, experts and the general public in their own efforts to balance the necessary structural remodelling in technology, business and society, and to create harmonious solutions.
>
> The environmental impact of phased attacking driving forces is minimized with technical and systemic agents.
>
> The environmental administration is an actor and partner that seeks durable solutions through dialogue with stakeholders and prepares their implementation.



Source: The first author's GCDB

Figure 15.
At far left: inventory decrease of arable land per capita, at near left: annual change of arable land per capita, at near right: arable land, at near right: first derivative of: (Land Use – Arable land)/(Land Use – Arable land) as per cent/100

6. Conclusions

In this analysis based on several approaches, possible long-term trends (megatrends) are considered and strategic conclusions for the future requirements of an environmental administration such as the AEL are drawn.

This paper selects an experimental procedure based on reality – not one based on theoretical models and hence largely independent from preselected paradigms. Therefore, trends of actual developments are analysed, not the calculated results of economic models.

The methodology proposed here is the consideration of "GMTs", i.e. forward looking that means the assessment of conspicuous "development paths" of techno-socio-economic systems by using the "Global Change Data Base" (© G. Ahamer, source, e.g. Ahamer, 2001, 2013, the authors continue their analysis in an article in CWIS 31(2)).

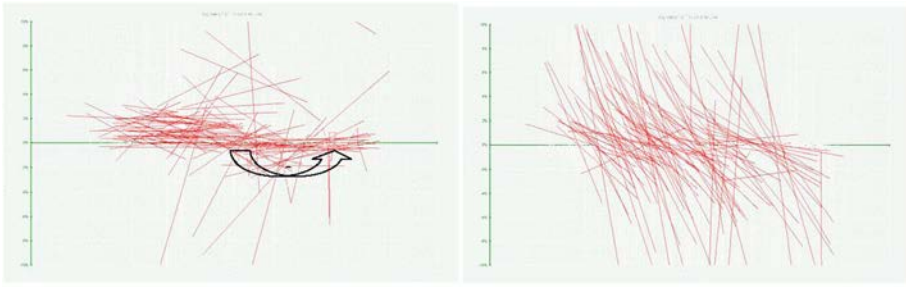
Based on to the interpretation of the analysed GCDB, one can try to read the dynamics of the development of civilisation. One possible direction of civilisational growth could be:

Population growth – secure nutrition – increasing prosperity – sense of fulfilment from quality of life.

Thus, the techno-socio-economic evolution could be considered in this way: consecutive periods are designated by their virulent topics: conquest, deforestation, trade guilds, transport infrastructure, urban planning, education; including further efficiency improvements and refinements. This gradual development towards a fully humanised world population was called by the palaeontologist Teilhard de Chardin (1955) the "Omega Point".

Such thinking in life stages is allowed by the concept of "blossoming evolution". The target of each phase (defined as the point at which the fastest change occurs) varies according to what was achieved earlier, and precedes the civilisation like a bow wave. Childbearing, full stomachs, menu improvements, food trade, affluence (our stage in Europe at present), quality of life improvement, fulfilment by meaning, growing beyond the self (which is safe to come according to the Global Change Data Base and also according to the futurologist Matthias Horx (2003)).

In this sense, an environmental administration accompanies people in this general trend towards a "society of meaning".



Source: The first author's GCDB

Figure 16.
At left: percentage change of arable land as a function of economic performance (GDP/capita): this change is negative in developed countries, but the trend seems to be reversing soon. At right: Percentage change of arable land per capita as a function of economic performance (GDP/capita): This rate of change markedly decreases worldwide!

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