



Drivers and pressures of city water resources – a risk-based decision support system for implementation of the Ecohydrology approach

The paper presents results of application of the DAPSET (Drivers and Pressures Strength Evaluation tool to the assessment of risk associated to different drivers and pressures of environmental quality in the City of Lodz. The tool was developed as a deliverable of FP6 NoE ALTER Net (A Long-Term Biodiversity, Ecosystem and Awareness Research Network)

www.alter-net.info

MOTIVATION

- ❖ to identify main drivers and pressures to environment and water resources in Lodz
- ❖ to understand the perceptions and approaches of decision makers towards main drivers, which influence the management decisions
- ❖ to define main areas of action towards reaching the Lodz Vision 2038
- ❖ to test usefulness and operability of the tool, and improve it

WHAT IS DAPSET?

DAPSET is a software-based instrument that provides snapshot assessments of important features of different drivers of biodiversity change and pressures adversely affecting biodiversity. The basis for the snapshot assessments is a set of eleven criteria with related measurement scales giving advice on the design of socio-economic monitoring activities and establishing a common denominator for importance appraisal. DAPSET is an aid to support communication with stakeholders and policy makers in order to identify management priorities and suitable response actions within the DPSIR (Drivers – Pressures – State – Impacts – Responses) framework.

The methodology provided by DAPSET frames the multi-dimensional character of factors inducing environmental change by strictly defined parameters in order to enable comparison of the impact of pressures and drivers at a number of scales. This not only promotes long-term studies on aspects of management and decision making but also the scaling-up or down of solutions and best practices.

FEATURE	LEVELS
DAMAGE POTENTIAL	- ENORABLE COSTS - NOTICEABLE COSTS - SIGNIFICANTLY BURDEN CITY BUDGET - EXCEED ANNUAL CITY BUDGET
PROBABILITY	- LOW - MEDIUM - HIGH - VERY HIGH
SPATIAL SCALE	- 1 DISTRICT - A FEW DISTRICTS - WHOLE CITY AREA - CITY & SUBURBANS
CONNECTEDNESS	- 1 SPECIFIC SECTOR - FEW SECTORS - MANY SECTORS - MAJORITY OF SECTORS
IRREVERSIBILITY	- 1 YEAR - 5 YRS - 1 GENERATION - IRREVERSIBLE
ACCELERATION	- DECREASING - STABLE - INCREASING - RAPIDLY INCREASING
PERSISTENCE	- LESS THAN 1 YR - UP TO 5 YRS - 5-10 YRS - MORE THAN 10 YRS
TIME DELAY	- NO DELAY - UP TO A FEW MONTHS - 1-10 YRS - MORE THAN 10 YRS
INVISIBILITY	- FULLY VISIBLE - REQUIRES OBSERVATION & MONITORING - REQUIRES SPECIALISED KNOWLEDGE - INVISIBLE
INFORMATION UNAVAILABILITY	- OPEN ACCESS - AVAILABLE AT LOW COSTS - ONLY SPECIALISTIC SOURCES - NOT PROVIDED TO THE PUBLIC
MOBILIZATION	- NO PUBLIC INTEREST - ATTRACTS SPECIFIC & LESS INFLUENTIAL STAKEHOLDERS - ATTRACTS IMPORTANT STAKEHOLDERS - MOST OF THE WHOLE PUBLICS



The 11 tool's criteria grouped into 2 classes:
Primary criteria: Damage potential, Probability, Irreversibility, Spatial scale, Connectedness, Mobilization;
Second order criteria: Acceleration, Persistence, Time delay, Invisibility, Information Unavailability.



<http://www.ufz.de/alternet/>

METHODS

STEP 1

Literature-based identification of main drivers and pressures for environment quality and water resources in the city, and selecting key 4 on the basis of questionnaire distributed among LA members

STEP 2

Feeding the tool with questionnaire-based information about main risk characteristics related to 4 chosen factors. The respondents were chosen exclusively from decision-making members of Lodz LA, mostly officers of the City Offices.

RESULTS

STEP 1

- Ecological awareness of citizens
- Law execution
- Economic potential of the city
- Adequacy and integrity of national and international regulations
- Land development
- Access to new technologies
- Welfare and life style
- Clear structure and competences of administration & governance
- International regulations
- Transport development & people mobility
- Community participation in decision making
- Political situation/environment
- Demography



INTERPRETATION

The "Management Value" (MV) indicates the need for action. The matrix shows four columns relevant for indicating this need: the Target zone (column LOW), the Observation zone (column MEDIUM/LOW) and two further columns referring to the Management zone (column MEDIUM/HIGH and column HIGH).

The management value is divided into two values, one for the first order criteria, and one for the second order criteria. The management value is a maximum four number value where each number represents the column of a zone. First number: represents the Management zone (column HIGH). Is this number 0 (e.g. 0111) then none of the assessed criteria is in this zone. Second number: represents the Observation zone (column MEDIUM/HIGH). Is this number 0 (e.g. 1011) then none of the assessed criteria is in this zone. Third number: represents the Observation zone (column MEDIUM/LOW). Is this number 0 (e.g. 1101) then none of the assessed criteria is in this zone. Fourth number: represents the Target zone (column LOW). Is this number 0 (e.g. 1110) then none of the assessed criteria is in this zone.

Meaning of the numbers: If the management value is a single number then all assessments are in the target zone, indicating that there is no need for urgent action to change the structure of the risk profile displayed in the matrix. If the management value is two-digit then at least one assessment is in the observation zone, indicating that there is no immediate need for action but rather for strengthened monitoring activities. If the management value is triple-digit then at least one assessment is in the Management zone (Medium/High), indicating a need for action in order to push the critical assessment value towards the observation zone respectively target zone. If the management value is four-digit then at least one assessment is in the Management zone (High), indicating an urgent need for action in order to change the critical structure of the risk profile.

CONCLUSIONS

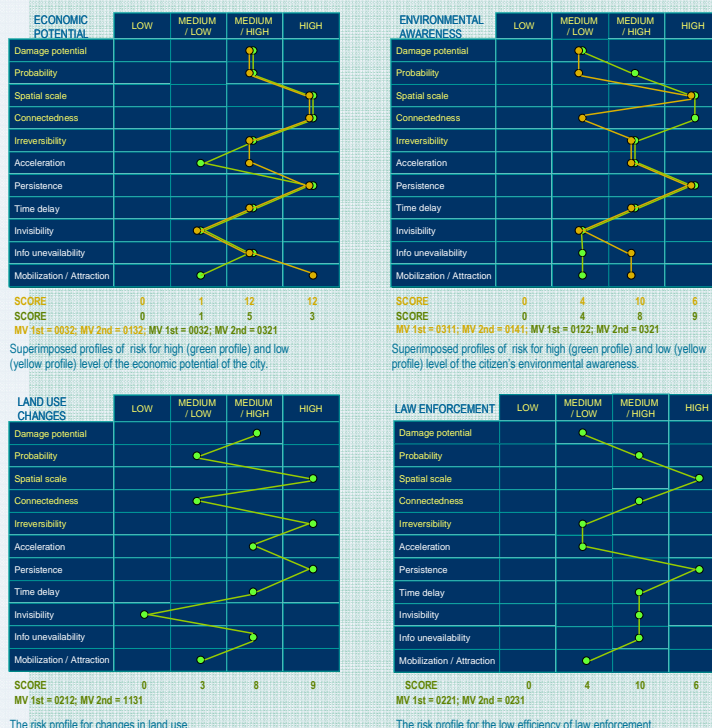
Among the analysed drivers citizen's awareness and economic potential have been assessed along two scenarios. Low economic potential imposes a danger of proceeding degradation of natural resources, cultural heritage and city infrastructure. The city may not be able to apply new technologies, invest in services, education, effective management. Ad hoc solutions to emerging problems are more likely to be applied than long-term planning. High potential may indicate a switch in priorities towards economic gains at costs of overuse of resources and green spaces, and intensification of urban sprawl, etc. Low citizen's awareness leads to limited law execution, lack of responsibility for the environment, low willingness to search and pay for new, environmental-friendly technologies, nature protection and conservation. Interestingly high awareness has been perceived by decision makers as a factor imposing higher risk to resources as that handicaps an implementation of city plans, and forces city government to enter long-lasting process of social consultation. As such high awareness 'disorganizes' of the decision making process.

According to the scores the low economic potential of the city requires intensification of management effort and hence extra investments in order to lower the risk. In this case the danger is related to the fact that the driver affects all economic sectors and may have a broad-scale, persistent impact. It also mobilizes community attention, however it may not necessary mean willingness to change a lifestyle or get involved in actions building up city potential. The profile of the low environmental awareness is of similar shape. High management values for both factors indicate that they require an urgent action based on integrated, trans-sectoral plan for the whole city.

The risk profile for land use change indicates that very little attention is given to land development and this factor is not perceived as urgent issue for the city. However decision makers are aware that the consequences of current land transformations may not be visible yet (time delay factor) and may affect many regions of the city in irreversible way. Finally low enforcement although often mentioned in discussions has been considered as leading to high environmental risk due to persistent consequences of big spatial scale, invisibility, delayed effects and unawareness of people that the problem does exist (limited access to information and low mobilization potential). Lower values for acceleration and irreversibility prove that there is possibility to solve the problem however it is complex due to involvement of many sectors (connectedness).

Ohi, C., Palarie, T.A., Krauze, K., Bezak, P., Gelen, A. 2009. DAPSET - Concept for characterising socio-economic drivers of and pressures on biodiversity. UFZ-Discussion Paper, 2/2009.

STEP 2



The risk profile for changes in land use.

The risk profile for the low efficiency of law enforcement.