How to insert measurement in the assessment.
The use of geo referenced measurement in the Strategic Environmental Assessment

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Key words: strategic environmental assessment, surveying measurement, impact significance

The use of punctual measurement in the strategic environmental assessment of plans, projects and programs is not widely performed, since neither legislation nor authorities do appreciate its need, so far.

It could be a way to minimize costs and explore the maximum of technology possibilities in an early stage of spatial decision using in real time real data.

The decision of the application of a material in the construction of a project or the measurement of the frequencies of a bridge (Spirakis, 2011) can give quantified values for the assessment not only for risk analysis purpose but also for the environmental spatial assessment, meaning the quantification of the impacts on strategic level, a good input on spatial planning.

So the objective could be the maximum precision of the available data used as documentation for the choice and decision and also the flexibility to assess any possible material, mathematical term or whatever as early as possible.

The result could be a data base using measures and impacts so assessing the direct relation between measurement and impact could give a result as clear as possible, as subjective as possible so any other assessment based on qualities could be added as information. This does not mean that qualities are inferior to quantities, but having

the chance to measure exactly means that we link precise the act with the impact so magnitudes are defined and significance could be based on solid magnitudes. So we correlate significance with magnitude. The case of spatial geoinformation has to be directly assessed the magnitude with significance, which is the mainstreaming case of this abstract.

If impact is magnitude/significance then significance is magnitude plus values. So impacts are easy to be assessed and relatively fast (though a bit unconventional comparing to heavy and not too flexible administrative procedures) but can use the data even if not the whole of them. But they are still good data, measured precisely and give a direct and clear tool for spatial planning.

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The use of geo referenced measurement in Strategic Environmental Assessment

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Abstract

The context of the present paper is about the deep analysis of the strategic environmental assessment as it has been formed and integrated in the legal eia system and its role in the eia concept, the role of plans and programs and the characteristics of their structure in the planning process in general and the connection to the surveying measurement as a step forward to the systematic and as punctual as possible estimation of qualities and quantities in the assessment of the sea process.

The development of a methodology framework of estimation and measurement of the significance of the impact on biodiversity in concrete can be a useful and effective paradigm to follow the direction both of conservation and of a stepping stone to development.

The geo referenced data easily accessible and effectively used can maximize the accuracy of the estimation and the capacity of the assessment in terms of quality and quantity.

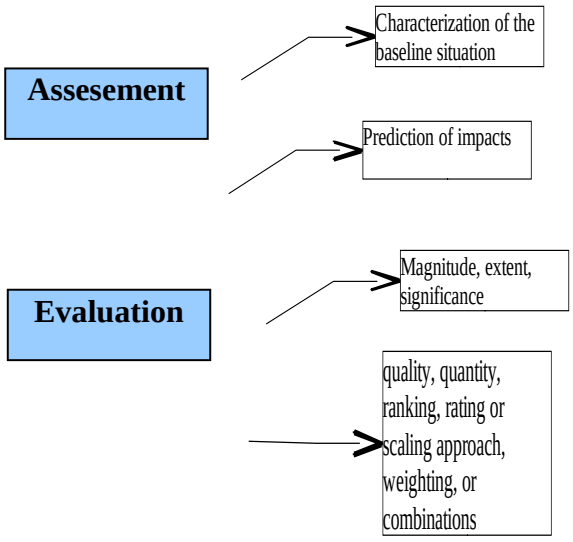
Key words: strategic environmental assessment, surveying measurement, impact significance

1. Introduction

The Strategic Environmental Assessment is about the good estimation of the quality and quantity of the impacts of a plan, program or project in an early stage of the

planning process. The concrete stages of the hole process are based on the eia logic meaning that sea works as a framework itself (Cassios, 2006).

The phases this work is referenced to are the assessment and the evaluation one. The assessment stage is about to identify how the activities of the proposed development will impact on the various components of the environment and involves the characterization of the baseline situation (with or without the project) and the prediction of impacts identifying the change. The evaluation is connected directly to the quality of scoping and the quality of baseline information. Evaluation stage has to answer the key question -how significant is the impact and if the proposal is technically feasible, economically and financially viable and legally permissible (Rajvanshi A., Mathur B. Vinod, Iftikhar A. Usman, 2007).



2. Methodology

The above mentioned generic framework for the EIA process is more evolved and more focused when the SEA is delivered.

Data collection from every kind of resources, historical records, direct observations, interviews and professional estimates is helping to predict and quantify the likelihood and the impact of damage effect under the designed scenarios. The need for more detailed data and measurement and also modeling seems to be the safest road to the documentation of the assessment.

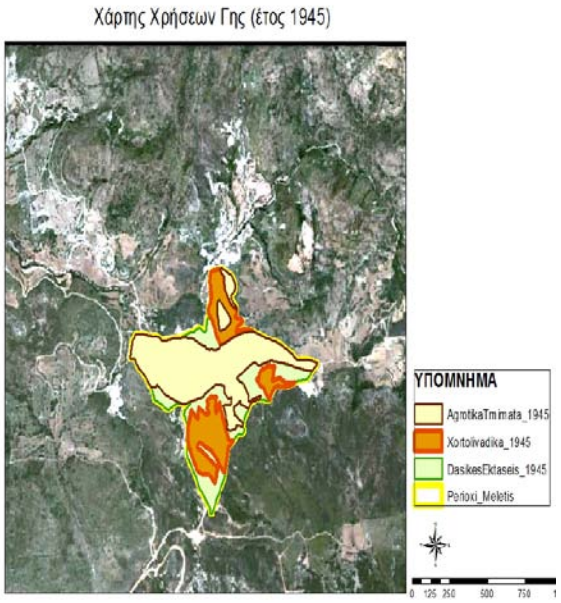
Naturalness appears to be the third from the start criteria in the ecological eia studies and starting from that point Treweek, 1999 gives some basic question that have to be answered when impact significance has to be measured and evaluated.

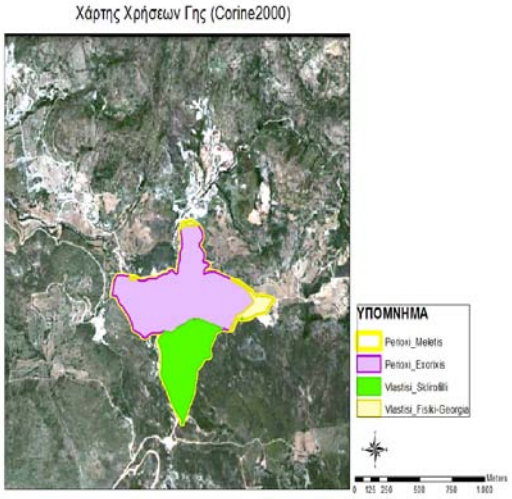
The index for importance values of criteria for naturalness are in order from small to large is high biotic disturbance, moderate disturbance, undisturbed (total natural).

The concept of the fuzzy significance matrix is about to have a tool combining quality and quantity dimensions, having a spatial reference measured in the possible accurate way, so the result could be one solid value ranked and weighted in the proper referenced system.

The primary data sources for the study included:

- CORINE Land Cover 2000 (www.opendata.gov.gr)
- maps from master thesis (Balomenou P.)
- land use for aerial photo development of 1946
- on site surveys





Step1

Situation1 (spot time1)	**Situation2 (spot time2)**
Φ1	C1
Φ2	C2
Φ3	C3

Impact (differences)	**Baseline reference**
Φ1-C1	Φι+C1
Φ2-C2	Φ2+C2
Φ3-C3	Φ3+C3

Impact (differences)	**Referenced Impact**
Δ1=Φ1-C1/(Φι+C1)	Δ12=Δ1/Σ
Δ2=Φ2-C2/(Φ2+C2)	Δ22=Δ2/Σ
Δ3=Φ3-C3/(Φ3+C3)	Δ32=Δ3/Σ

Step 2
Index+(Perceived) Value (Vi)

Vi is taken from criteria analysis, a proper but correlated hierarchical system and questionnaires to the involved audience and experts

ΣV=V1+V2+V3 so the Δs are:

Δ12XV1/ ΣV=A1

Δ22XV2/ ΣV=A2

Δ23XV3/ ΣV=A3

Δ12	Δ22	Δ23
V1	V2	V3

If the relation is linear for the simple way to see it in this case then the conclusion is the final matrix base on the following data:

Impact	Value	Referenced Index (%)	Significance
Δ12	V1	A1	S1=A1/V1
Δ22	V2	A2	S2=A2/V2
Δ23	V3	A3	S3=A3/V3

Impact Significance Matrix

	Φi		Ci	-Φi-Ci	Φi+Ci	Δi	Δi2	Vi	Ai	Ai (%)	Si	Si
CORINE 2000	Surface (m^2)	**LAND USE 1945**	Surface (m^2)									
Extract materials zone	317502,09	Forest Land	121428,49	-196073,6	438930,58	-0,446708	-9,29E-007	1	-0	0%	ΛΆΘΟΣ	
Hardleaves vegetation	139872,49	Landparts with grass	121970,59	-17901,902	261843,08	-0,068369	-1,42E-007	2	-0	0%	ΛΆΘΟΣ	
Cultivated land with big natural parts	23512,08	Rural land	237487,58	213975,498	260999,66	0,8198306	1,70E-006	3	8,52E-007	0%	ΣΩΣΤΌ	
	480886,66		480886,66					6			boolean value	

2.1. The use of modern geodetic methods in implementing and monitoring a technical project

Geomatics is the science of collecting, processing and managing spatial data. One of the most prime and determinants factors, therefore, is the correct and accurate data collection. The post-processing and the modelling depends on the accuracy with which the raw data have been taken. Surveying engineering is required to develop such methods to ensure and certify the accuracy required in small or large scale operations.

The evolution of technology has brought in Surveying Engineering – Researcher, modern geodetic instruments that provide the ability to perform high precision measurements in small or even large scale sites.

Thus, the role of Surveying Engineer in the scientific community is particularly important as holding the necessary knowledge and appropriate tools to answer questions critical to safety.

Such instances are the study of deformations of technical structures or soil, control and compliance with specific construction standards, etc.

Going one step further, it becomes obvious that the available technology today and the advanced measurement methods may be very useful tools in the process of strategic planning for a technical project.

The feasibility, the potential construction methods and sustainability of a structure are just some of the factors that may be considered when designing and after the necessary geodetic measurements have been made. Especially the last two, are inextricably connected with the implementation cost of

the manufacture.

To make all these easily understood, three examples of geodetic measurements, during the design phase but also during the implementation of a road, a dam and a bridge, will be given.

2.2. The application of geodetic methods in dam construction

The possibility of constructing a dam but also the cost of construction is in direct correlation with the location chosen to build this. The probability of failure due to soil quality can be minimized by making it suitable geodetic measurements. Once selected the dominant positions, which serve social and environmental criteria, the position which enables the economical manufacture of this should be chosen and.

In each one of these sites, a local area network of control-points is established, in order to detect movement of the soil (e.g. subsidence) in the area. The points will be selected so, as the network vertices must be distributed in the area and their number varies, depending on the terrain morphology.

Measurements can be made either with high precision total stations, or GPS receivers..

The network is measured in 2 or 3 different epochs. In each phase the coordinates of the vertices of the network are calculated and compared to the original ones. Thus, possible shift is detected / identified. The process offers precision of mm.

Respective, controls should be made (even less frequently), during the construction project, and after that. This reduces the probability of failure, but mainly it is possible to control the structure, defining the costs of repair and maintenance.

2.3. The application of geodetic methods in road construction

Any new drilling site has various benefits to society. Whether referring to a main road or in a small country road, the construction cost is high in any case. Is critical, therefore, the correct choice of parameters to be studied in the phase of strategic planning. The science of photogrammetry are especially useful when designing a road. The role of Surveying Engineering of this case is not to control the manufacturing capability, but to choose the best formulation using PS.M.E. (Digital Terrain Model) as shown by aerial treatment.

Creating a route is associated with a variety of factors such as manufacturing engineering,

apallotrioumenes land, topography, etc. Creating othrofotocharton and PS.M.E. provides analysis, both qualitative, and quantitative data.

In addition they can identify areas for apallotriosi (and therefore compensation), the type of vegetation along the axis (factor taken into account in the environmental design), terrain slope, and potential points of construction projects.

Even for this process to create orthophotomaps a series of aerial required field work which in this case can be made, both by land and with satellite methods.

2.4. The application of geodetic methods in bridge construction

Similar to the previous two cases the measurements can be made at the planning and implementation of a bridge. The environmental impact alone is not quite at the stage of strategic planning. For sustainability but above the safe manufacture and use of such a construction Engineer Surveyor is required to give answers at different stages.

Initially the study aerofotografion can answer the question of the possible locations of the bridge construction. The study and understanding of the specific conditions of the area and the type of vegetation play a crucial decision. Nevertheless a number of geodetic measurements in conjunction with previous will lead to safer conclusions about the decision.

Furthermore measurements must be carried out during construction and afterwards. So you can control the construction specifications, safety and the static of the bridge (similar application was made on the bridge of Chalkis, Spirakis, 2011).

3.Conclusions

Summing up, one realizes how, through an inter-science approach and collaboration of different scientists can achieve optimum results. The Survey Engineer can give answers to questions both quantitatively and qualitatively.

Different geodetic measurements can contribute to decision making, to be considered before a final decision, but also serve as a powerful tool even beyond. This may at any time, check the quality of work, filter the different parameters, and each project can be completed at minimum cost and

maximum return to society.

The use of an Impact Significance Matrix (is a possible the answer to the question how much significant is the named impact) which can give a solid correlation between impact, value and index can give a good estimation of the significance of the impact referenced to criteria and value ranges. This could be ah hybrid core value system adding a small step foreword and being the stepping stone to the significance quantification of other environmental parameters too.

Each scenario can be checked and assessed with this simple and clear way. The matrix can be used as a well focused and direct tool to the assessment of significance. Within this way of logic general and special requirements can be edited for different categories of plans, programs and works. This matrix could be the way to insert measurement in the strategic environmental assessment in the evaluation stage based on the following theory.

The dynamics of SEA procedure both with the fuzzy logic approach can lead to the configuration of what if choices of the quality and quantity of human interventions on nature so that decisions can be more safe and sound in their relative concept of uncertainty. The effectiveness of the use of indices involved in the environmental assessment is limited since the limits can be changed relatively easily. The quantification of the quality in a mathematical concept where the formation of what if scenarios are based on “numbered” assessments.

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