

Workshop on
OR for Developing Countries

EURO WG ORD

Young Researchers' and PhD Symposium

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University of Economics

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EURO ORD EURO Working Group
"Operational Research for Development"

 Association of European
Operational Research Societies

 University of Economics, Prague,
Czech Republic

 Institute of Applied Mathematics,
METU, Ankara, Turkey

 University of Bristol, United Kingdom

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 Sasol, Rosebank, South Africa

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Programme

Venue: RB (Rajska building) 213

- 07:45-08:45 **Registration**
- 08:45-09:00 **Opening session**
- 09:00-09:45 **Invited session** *Chair: Leroy White*
Ali GÖKMEN, Inci Gökmen, Halil Önder & Gerhard Wilhelm Weber
Sustainable Living in Balaban Valley
- 09:45-10:30 **Invited session** *Chair: Marthi Harmse*
Dennis FINLAYSON
Hard and Soft Approaches - is it worth trying to bridge the gap?
- 10:30-10:45 **Refreshments**
- 10:45-12:15 **Contributed session** *Chair: Ali Gökmen*
Karl F. Doerner, Walter J. Gutjahr & Pamela C. NOLZ
Multi Criteria Location Planning for Public Facilities in Tsunami Prone Coastal Areas
Claudia Cristina RAVE
Integrated Energy-Environment-Economy Evaluation for Urban Territory Planning and Sustainable Development
- 12:15-13:30 **Lunch** (University Restaurant)
- 13:30-14:15 **Invited session** *Chair: Leroy White*
Francoise Summers, Soofia T. Elias-Özkan & Gerhard Wilhelm WEBER
Kerkenes Team: a Short Presentation and Demonstration on the Kerkenes Eco-Center Project Activities
- 14:15-15:00 **Invited session** *Chair: Dennis Finlayson*
Theodor STEWART
Operational Research for Development in Africa
- 15:00-15:45 **Invited session** *Chair: Marthi Harmse*
Dorien DETOMBE
Address from the chair: EURO Working Group on Complex Societal Problems

- 15:45-16:00 **Refreshments**
- 16:00-17:00 **Research dialogues**
- 17:00-17:15 **Closing session**
- 18:30-21:00 **Supper** (The Sklep)

Sustainable Living in Balaban Valley

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Sustainable living is maintaining a balance between the human needs to improve the quality of living and preserving natural resources and ecosystems. In developed countries current life style trend is based on consumption of natural resources at a rate more than they are renewed by natural ways. The climate change becomes a major threat to the whole world. More than half of the population of the world and about 30 % of population of Turkey live in rural areas. Forcing rural population to migrate to the cities, as proposed by western countries, will increase the burden on climate change further in the future. The objective of this study is to develop a model project to improve the quality of living in rural areas, but at the same time maintaining and improving the quality of ecosystems. Replacing the conventional energy sources based on fossil fuels in agriculture and transportation by renewable sources produced on site, agriculture based on local seeds, optimum water consumption, marketing organic grown produce, all based on permaculture principles are some of the studies tried during this project. Management of water resources in Balaban Valley will be handled based on the data available on precipitation, dynamics of surface and underground water. Furthermore, optimization of transportation of goods, humans for travel and health services, education within the valley and local towns and cities will be considered. The social issues, decision making, group building, conflict resolution constitute the third important leg of sustainable living in rural areas, besides economy and environment.

Hard and Soft Approaches - is it worth trying to bridge the gap?

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Background

At Sheffield University in the early 1990s I ran a summer programme for development planners drawn from around the world on project design, appraisal and implementation. As part of the information technology element, or computer applications in planning as we then designated the unit, participants were introduced to Friend and Hicklings SCA and the STRAD software. My aim was to add to the Spreadsheet, Survey Analysis, PERT and Geographical Information tools that were already on offer as the courses were based in a Town and Regional Planning Department. Also, I saw SCA as a way of helping students organize their ideas. A version of Colin Edens work, which we called causal diagramming for this purpose, as well as project/logical frameworks and some other tools used in development planning practice by donors, NGOs and recipient governments, for example were also introduced to the participants. So I felt that the hard and soft methods complemented each other and as a practitioner I was at ease with the overall package. When John and I moved to Lincoln we found ourselves working in the Management School where the typical course participant was less numerate than had been the case at Sheffield. In addition, I had to adjust to a situation where most of the IT and Project Planning was already being delivered in existing, well established Units of the overall Masters programme. As a result the link between soft and hard methods was lost!

The debate at ISSS?

Each year, usually a post graduate student or other recent arrival into the Systems field, makes a plea for a bridge to be built between the soft and hard wings of the field. Last year, following a presentation by a leading scholar in soft methodologies, certain questions were asked relating to the future of education in systems thinking. How could more rigour and discipline be introduced into soft methods? -----Should, for example, more effort be made to quantify some indicators, or reproduce the outputs of workshops in different circumstances and so on? -----Should/could statistical testing of outcomes be undertaken for example by comparing the rankings of different stake holders priorities before and after participatory exercises? The role of Living Systems Theory was also raised, and it has since been suggested in correspondence that various soft methods such as SCA, SSM and VSM and so on could be mapped onto the much more extensive living systems model, as set out by Miller and more recent authors. It is not clear to me whether there is an equivalent of LST in the OR context since biological models are not apparently utilized? So what would be the equivalent if it were indeed useful to attempt to find one.

Could the missing link be linear programming/game theory or project planning

itself as utilized at Sheffield above? What might be the benefit of any effort? A more unified profession? Greater fertilisation of one area of expertise by another? A more common, coherent language for clients and students to understand? Any other ideas?

Multi Criteria Location Planning for Public Facilities in Tsunami Prone Coastal Areas

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After a tsunami occurrence, public facilities such as schools have to be reconstructed in a devastated coastline. For the location decision, possible locations are evaluated according to three criteria: (i) a combination of the p-median criterion, which minimizes the sum of distances between all members of a population and their nearest facility, and the maximum coverage criterion, which measures the population members unable to reach a facility within a predefined maximum distance, (ii) a tsunami risk criterion, based on estimates of the probability of future tsunami occurrences, and (iii) a cost criterion, related to specific construction methods, influencing the safety of a building. In order to quantify the risk, a statistical model for tsunami occurrences by Kaistrenko and Pinegina (2001) is applied.

For the solution of the multi-objective optimisation problem two approaches are applied in order to find (potentially) Pareto-optimal points. Implementations of the Nondominated Sorting Genetic Algorithm II (Deb et al., 2002) are developed as a heuristic solution procedure, which are compared to a decomposition technique where the region under consideration is partitioned into smaller sub-regions. The problem is solved for each separate sub-region and the according solutions are later combined. Brute Force Complete Enumeration is chosen in order to solve the sub-problems exactly. As this procedure allows the detection of efficient portfolios within acceptable time only for comparatively small problems, larger sub-regions are treated heuristically.

Both approaches are tested based on two real-life instances from Sri Lanka. More specifically, the algorithms are applied to a coastal area in the district of Galle in southern Sri Lanka, which has been devastated by a Tsunami in 2004.

Keywords: Multi-objective Combinatorial Optimisation, Location Analysis, Genetic Algorithm, Disaster Recovery Planning

Integrated Energy-Environment-Economy Evaluation for Urban Territory Planning and Sustainable Development

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Cities are main actors in the achievement of sustainability goals at all spatial and temporal scales. Normally, the planning processes (if existent), are disarticulated and aggregate, there is little knowledge about externalities and problems caused by planning interventions and consequently the intervention cycle is generally corrective. The disarticulation and aggregation brings normative as well as implementation problems at every social and planning level in most localities.

The implementation of tools for integrated analyses is required in the mentioned context, to support the analyses of a complete planning cycle. The construction of these tools requires a conceptual and a methodological approach, novel and interactive between the design and learning process, that allows the reformulation, an re-understanding of the local integrated planning problem.

A proposal is presented for the formulation and implementation of an integrated model as an analysis tool, for prospective urban planning, that drives on the evolution of the territorial occupation within the city (cities) as a dynamical scenario, that defines impacts and feedbacks in all energy, environment, economy an territorial dimensions of local planning. The tool, following the potential of integrated modeling will be disaggregated, and will be implemented in the Metropolitan Region of the Aburrá Valley (Medellín, Colombia).

The research offers several contributions in the conceptual level for urban planning -externalities analysis, energy and territorial integrated analysis- and operational research, and offers a tool (methodological and modeling system) for planning based on the integrated analysis of impacts at different levels, traditionally evaluated in a disaggregated way and intended to work with different actors.

The application in the Metropolitan Region contributes due of the level of specialization and relevance to the region, thus resulting in the reformulation or formulation of integrated regional interventions and in the construction of future scenarios breaking the cycles of the enunciated problems.

Keywords: Integrated Modelling, Externalities Analysis, Urban Planning, EEE Approach, Energy Planning

Kerkenes Team: a Short Presentation and Demonstration on the Kerkenes Eco-Center Project Activities

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The Kerkenes Team has the pleasure to invite you to a presentation and demonstration on the Kerkenes Eco-Center Project activities which include the promotion of solar energy, organic gardens and drip irrigation and energy efficient building construction. Kerkenes is a village in Central Anatolia, Turkey.

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