Multi-objective Analysis and Sustainable Development: Understanding the Cornerstones and the Process in a Nutshell

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Multi-objective methodology is a well-accepted procedure that has long been used as a decision-making aid for public-sector environmental and planning issues. Its application has evolved over time with the recognition of the wider opportunities that the methodology provides for resolving environmental conflicts.

The opportunities have widened as its applications expanded from conflicts involving a single land use such as a dam project - to more complex conflicts, such as multiple and competing uses of natural resources, where the evaluation of sustainable development was in issue.

Environmental problems
are invariably sustainable development problems.
Action for climate change
is a classic sustainable development issue.

Finding sustainable solutions requires the multiple and competing objectives of sustainable development – *ecological, economic, social (including cultural)* - to be assessed and balanced, equitably.

An Outline of the Multi-Objective Analysis Methodology: *Action for Climate Change Case Study*

Established concepts and principles from conflict resolution and environmental management and protection are the foundation for the methodology adopted by environmental scientists and planners.

Two key elements of ***"Principled Negotiation"*** are the ***cornerstones*** for the use of multi-objective analysis as an environmental decision-making aid for finding sustainable solutions: -

(i) Constructing options ("*creative scenarios*") for mutual gain; and

(ii) Reliance on the use of the same objective criteria to evaluate all scenarios.

- The methodology requires several ***scenarios*** to be developed within the NDC of each UNFCCC Party, along a continuum of sustainability in which the balance between ecological, economic, social and cultural considerations varies.
- *A **scenario** is a hypothetical construction of different actions or measures countries pledge to undertake to limit or reduce their carbon emissions to curb warming to 2°C above pre-industrial levels.*
- Each scenario should represent a "creative option for mutual gain." For a ***scenario*** to be a "creative option for mutual gain", it should be climate change-effective and enhance and promote the cost-effectiveness of mitigation and adaptation measures; and it should be equitable, relative to other NDCs.
- *An innumerable number of **scenarios** could be constructed. But the methodology requires a finite number of scenarios - with one proviso: All feasible actions or national measures for reducing carbon emissions are to be included in at least one scenario.*
- Technological measures to reduce carbon emissions, where ***scientific uncertainty*** exists, would only be included in a scenario when the uncertainty/environmental risk for their application had been resolved.
- *Framing appropriate **multiple objectives** for sustainable development is crucial for ensuring multi-objective analysis methodology is an effective decision-making aid for sustainable development.*
- To remove any subjectivity in the evaluation of scenarios, the ***multiple objectives*** for sustainable development must be able to be measured.

- At the outset, there is a need to ensure an adequate scientific data and information base is available to evaluate these objectives.
- *The **multiple objectives** provide the foundation for evaluating each scenario for its compatibility with sustainable development: Compatibility could be assessed as "**compatible**", "**non-compatible**" or "**uncertain**". Reasons should be given for these conclusions.*
- The use of ***objective criteria*** to evaluate each scenario is an essential pre-condition for success. Selection of the criteria to evaluate each objective is crucial. All criteria have equal weight in the evaluation process.
- *The same **objective criteria** are used to evaluate all scenarios. The objective criteria need to be selected based on standards such as: Scientific merit or equity; to be independent of each UNFCCC's party's will; and to be legitimate and practical standards.*
- The continuum of ***scenarios*** is not fixed - but may change after evaluation commences.
- *The **preferred scenario** is one that most effectively balances the multiple and conflicting objectives for sustainability and which secures as much available value as possible. It may be one of the original scenarios evaluated.*
- In the situation that no single scenario is clearly superior, a new scenario could be constructed based on the best features of one, or more, or all the scenarios evaluated to become the ***preferred scenario***. It must then be evaluated for its compatibility with sustainable development.

Conclusions

Equity, an obligation under both the Paris Agreement and the concept of sustainable development, requires outcomes – in the case of climate change - which minimise the extent to which environmental costs and benefits are shared disproportionately between all 176 Parties that have ratified the Paris Agreement.

One view of the multi-objective analysis methodology is that because most public-sector problems involve multiple conflicting objectives — whether in environmental policy, water resources, energy or public health — the opportunity for the methodology is unlimited.

Problems that must be avoided are using unnecessarily complex objective criteria; or objectives that cannot be measured or quantified; and, of overriding importance, criteria that cannot be evaluated because of the absence of a suitable information base.

*A **model template** for resolving conflict over co-existence between competing land use interests, developed by the author, can be downloaded on the following **LINK**. The multiple objectives for sustainable development, and the objective criteria used to evaluate each objective that were framed, can be modified to apply, as appropriate, to the specific environmental conflict.*

TAGS: Climate change; sustainable development; multi-objective analysis; methodology; multiple objectives; scenarios; objective criteria