Qualitative Measurement of Sustainable Development for Hilla City Environment

Ahmed T. S. Auda
Assistant Lecturer -Environment Department - College of Engineering
Babylon University

Abstract

Hilla's transition to the 21st century has a series of question marks in relation to the environment, the social well-being of the population, and the future path of economic development. Sustainable development meets the needs of the present without compromising the ability of future generation to meet their own needs. There is still considerable confusion on how to move toward that desired state.

In weighting the systems researcher collects and compare different kinds of factors, and their future magnitude prediction, by using Leopold matrix to measure the impact of the three dimensions of sustainable environment in Hilla city to providing a visual assessment for qualitative approach to identify the magnitudes and importances. Results shows that there are environmental effects in many economic actions like markets, energy, material, and growth parameter, while in environment actions waste, human health biodiversity, with water surfaces parameter, and in social actions health and safety, with stability, cultural identity parameters.

القياس النوعي للتنمية المستدامة وقدرة التحمل لبيئة مدينة الحلة

الخلاصه

الأنتقال الى القرن 21 لمدينة الحلة فيه سلسلة من العلامات التساؤلية فيما يتعلق بالبيئة ، والسعادة الاجتماعية للسكان ، والمسلك المستقبلي للتطور الاقتصادي. التنمية المستدامة توفر المتطلبات والاحتياجات الآنية دون المساس بقدرة الأجيال المقبلة على تلبية احتياجاتها . وما زال هناك إرتباك كبيرة فيما يتعلق بكيفية التوجه نحو هذه الحالة المثلى.

وفي قياس النظام قام الباحث بجمع ومقارنة مختلف أنواع العوامل والتنبؤ بمقدارها المستقبلي بواسطة إستعمال طريقة مصفوفة ليبولط لقياس تأثير الأبعاد الثلاثة للتنمية المستدامة لمدينة الحلة من أجل الحصول على تقييم مرئي للإقتراب النوعي للتعرف على المقادير والأهميات.

وأظهرت النتائج بان هناك تأثيرات بيئية في كثير من الفعاليات الإقتصادية مثل الأسواق ، الطاقة ، والمواد وفي عامل نسبة النمو لها . أما في الفعاليات البيئية فالفضلات وصحة الأنسان من خلال تأثيرها المعاكس بايولوجياً وفي مشاكل عامل المياه السطحية. وإجتماعياً هناك تأثيرات في الصحة والسلامة مع عامل الإستدامة وهوية المجتمع.

Introduction

Many engineering works are designed to last for decades or even centuries, more emphasis should therefore be given to long-term environmental trends even though the problem of the day may seem of overwhelming importance (Henry and Gary, 2009). Dealing with global problems, in 1987 the World Commission of Environment and Development (WCED) published its report “our common future”, which give considerable prominence to the phrase sustainable development that is “development which meets the needs of the present without compromising the ability of future generation to meet their own needs” (WCED, 1987). This idea provides a new dimension to economic and ecological policy formulation. Ultimately global sustainable development will require a stabilized world population living in a secure social and physical environment. This situation is unlike the “steady-state” attainable in laboratory experiments under controlled conditions (Daly, 1991; Clark and Munn, 1986; Eckholm, 1982). The study goal is to

find availability of Hilla environment to be sustainable, by environmental socioeconomic analysis.

Concept of sustainable development

It is a pattern of resource use that aims to meet human needs while preserving the environment so that these needs can be met not only in the present, but also for generations to come (Smith and Gareth, 1998, Holdgate et al., 1983). Accepting that is an important concept, there is still considerable confusion on how to move toward that state (Clark and Munn, 1986). Sustainable Development improves the quality of human life while living within the carrying capacity limits of supporting ecosystems to fulfill the needs of the present and the future, determined by the state of technology and social requirements. (IUCN, 1991), uses natural renewable resources in a manner that does not eliminate or degrade them or otherwise diminish their renewable usefulness for future generations while maintaining effectively constant or non-declining stocks of natural resources such as soil, groundwater, and biomass (World Resources, 1992). All this is based on the premise that current decisions should not impair the prospects for maintaining or improving future living standards. This implies that our economic systems should be managed so that we live off the dividend of our resources, maintaining and improving the asset base (Repetto, 1986). Many authors have point out that environmental sustainable development means growth, evolution, economy (Munn, 1992), see Figure (1), which illustrated the concept.

The concept has challenged society to chang from its destructive, exploitative philosophy to one that fosters long term protection of the environment (Clark and Munn, 1986).

Indigenous peoples have argued, through various international forums such as the United Nations Permanent Forum on Indigenous Issues and the Convention on Biological According to Hasna Vancock, sustainability is a process which tells of a development of all aspects of human life affecting sustenance. It means resolving the conflict between the various competing goals, and involves the simultaneous pursuit of economic prosperity, environmental quality and social equity famously known as three dimensions, with is the resultant vector being technology, hence it is a continually evolving process; the process of achieving sustainability is of course vitally important, but only as a means of getting to the destination of the desired future state. However, the destination of sustainability is not a fixed place in the normal sense that we understand destination. Instead, it is a set of wishful characteristics of a future system (Hasna, 2007).

Environmental Sustainability

The idea of environmental sustainability is to leave the Earth in as good or better shape for future generations than we found it for ourselves. By a definition, human activity is only environmentally sustainable when it can be performed or maintained indefinitely without depleting natural resources or degrading the natural environment (Newton, 2001).

1. Resource consumption would be minimal
2. Materials consumed would be made entirely of 100% post-consumer recycled materials or from renewable resources (which were harvested without harm to the environment and without depletion of the resource base)
3. Recycling of waste streams would be 100%
4. Energy would be conserved and energy supplies would be entirely renewable and non-polluting (solar thermal and electric, wind power, biomass, etc.)
5. Destination of the physical environment of cities and their surrounding regions, and the range of pressures exerted by population and human activity.

Equitable

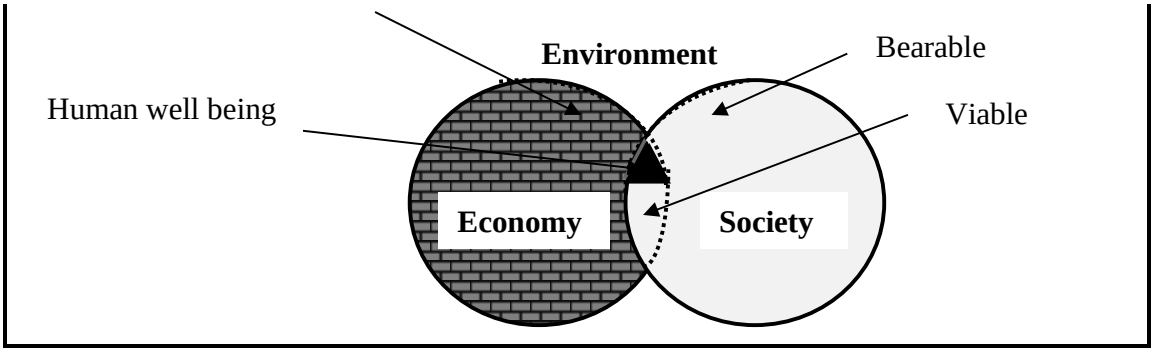

Figure (1) Scheme of Sustainable Environment at the confluence of three constituent parts; by the researcher with assistance of (Henry and Gary, 2009; Masters, 2005; Munn, 1992)**.**

Managing the Environment

Managing the environment wisely and equitably requires the balancing of a number of conflicting interests, which is still have a considerable confusion on how to move toward that desired state.

Is taken to mean a positive rate of change in the quality of life of people, based on a system that permits this positive rate of change to be maintained indefinitely, the net benefits of economic development, subject to maintaining the services and quality of natural resources, and development without growth a physically steady-state economy. That may continue to develop greater capacity to satisfy human wants by increasing the efficiency of resource use, but not by increasing resource throughput. The search and the carrying out of rational strategies that allows society to manage, in equilibrium and perpetuity, its interaction with the natural system. Such that society, as a whole, benefits and the natural system keeps a level that permits its recuperation (Henry and Gary, 2009).

Weighting Factors Methods

A weighting system may comparison of different kinds of factors, and their future magnitudes prediction. The weights may be estimated by the Delphi method, in which each member of group of people is asked to rank the importance of various factors or effects. Each person is then advise of the answers of other member and is invited to review and amend his or her own responses (Henry and Gary, 2009; Ward and Dubos, 1972).

Leopold matrix qualitative method (Leopold et al., 1971) one of the simplest approaches to providing a visual assessment (see appendix 1).

Human health and well-being

The questionnaire by researcher with respect to Alnaser 1989, shows that the health of Iraqians or Hilla people is good by international standards until 40 years with healthy life expectancy in range of (63 years), and a man can expect to die ten years younger than a woman. Where, for example, Australians healthy life expectancy (73 years) and a man can expect to die six to seven years younger than a woman (Masters, 2005; Newton, 2001).

Procedures of Weighting Factors for Sustainable Environment in Hilla City

Leopold matrix qualitative method was used to providing a visual assessment for sustainable environment in Hilla City. The result included in Table (1).

Conclusions by Qualitative Approach

Leopold matrix method for Economic impact in Hilla city shows the following results:

1. All actions namely, markets, energy, material, cause maximum damage, because the absence of clear eye.
2. 1 parameters namely, growth have been the most affected due to aimless with absence of opportunity.

And for environment impact shows the following results:

1. 2 actions namely, waste, human health biodiversity, have been the most affected due to daily effluence to future Stability.
2. 1parameters namely, water surfaces, cause maximum damage, comparing with air and Soil.

And for social impact shows the following results:

1. 1 action namely, health and safety cause maximum damage to the relationship of sustainable development.
2. 2 parameters namely, stability, cultural identity, have been the most affected due to lack of scientific philosophy about the future identity and the attitude of people live.

Recommendation

1- From all the perfuse we using methods, systems and materials that won't deplete resources or harm natural cycles.

2- If global sustainability is achieved it will be because of human ingenuity and the natural adaptation of living things to a continually changing world.

3- there is uncertainty on how best to do, so economists and ecologists most work together for the first time.

4- Maximum use of renewable building materials, minimum use of non-renewable, energy intensive building materials like steel, brick, vinyl, aluminum and insulation.

6- Design and build for long useful service life.

7- Sustainable environment requires a decision support approach that accounts for dynamic connections between social and ecological systems.

8- All political, technical and social developments can easily be evaluated in the light of sustainable development by these two arguments needs and limits. Any development should help fulfill needs and should not increase limitations.

References

Clark, W.C. and Munn, R. E., 1986, "Sustainable development of the Biosphere", Cambridge university press, Cambridge.

Daly, H. E., 1991, "Steady-State Economics", 2nd ed., Island Press ,Washington, D.C.

Eckholm, E. P., 1982, "Down to Earth: Environment and Human Needs", W.W.Norton, New York.

Henry, J.Glynn and Gary, W. Heinke, 2009, "Environmental Science and Engineering", P.692-693, Second Edition, Prentice – Hall of India, New Delhi.

Holdgate, M. W., Kassas, M., and White, G. F., 1983 , "The World Environment", Tycooly, Dublin.

Hasna, A. M., 2007, "Dimensions of sustainability". Journal of Engineering for Sustainable Development: Energy, Environment, and Health **2** (1): 47–57.

International Union for the Conservation of Nature and Natural Resources (IUCN), World Conservation Union, United Nation Environment Programme (UNEP), and World Wide Fund for Nature (WWF), 1991, "Caring for the Earth", P. 10, Gland, Switzerland.

Leopold, L. B., Clarke, F. E. Hanshaw, B. B., and Balsey, J. R., 1971, "A Procedure for Evaluating Environmental Impact", U.S. Geological Survey Circular 645, Washington D. C., Government Printing office.

Masters, Gilbert M., 2005, "Introduction to Environmental Engineering and Science", Prentice – Hall of India, New Delhi.

Munn, R. E., 1986, "Towards Sustainable Development ", J. Atmospheric Environment, 26,2725-2731.

Newton, Peter W., 2001, "Australia State of the Environment Report", CSIRO, Department of the Environment and Heritage, Australia.

Repetto, R., 1986, "World Enough and Time", P. 15-16, Yale University Press, New Haven, CT, USA.

Smith, Charles, and Rees, Gareth, 1998, "Economic Development", 2nd edition. Basingstoke, Macmillan.

Ward, B. and Dubos, R., 1972, "Only one Earth: The care and Maintenance of a Small Planet ", W.W.Norton, New York.

World Commission on Environment and development (WCED), 1987, "Our Common Future ", P. 4, Oxford University Press, New York, USA.

World Resources Institute, Dimensions of sustainable development, 1992, " A Guide to the Global Environment", P. 2, Oxford University Press, New York, USA.

المصادر العربية

الناصر، عبد المجيد حمزه ، وعصريه ردام المرزوك، 1989،(العينات)، ص 1 – 10، وزارة التعليم العالي، جامعة بغداد ، بيت الحكمه – مطبعة التعليم العالي في الموصل.

Table (1): Leopold Matrix explaining the impact of the Three Dimensions of Sustainable Environment in Hilla City.

No.1	Economic	Proposed action			
	Characteristics	markets	energy	material	**Total**
1	**growth**	+ 6 / 7	+10 / 9	5 / 7	21 / 23
2	**development**	2 / 2	6 / 7	6 / 7	14 / 16
3	**Productivity**	5 / 4	8 / 8	6 / 7	19 / 19
	Total	13 / 13	24 / 24	17 / 21	

No.2	Environmental (Integrity)	Proposed action					
	Characteristics	Carrying capacity			renewable raw materials	Human health (biodiversity)	**Total**
		waste	emissions	toxic substances			
1	Air		3 / 5	1 / 1		3 / 3	7 / 9
2	Soil	1 / 1		1 / 1	3 / 5	2 / 2	7 / 9
3	Water surfaces	5 / 9		3 / 9	3 / 3	4 / 5	15 / 26

Total	6 / 10	3 / 5	5 / 11	6 / 8	9 / 10

No.3	**Social**	**Proposed action**			
	Characteristics	health and safety	Quality of life	Benefits	**Total**
1	Stability	+4 / 6	2 / 2	1 / 1	7 / 9
2	equity		1 / 1	1 / 1	2 / 2
3	Cultural Identity	5 / 4	1 / 2	1 / 1	7 / 7
	Total	9 / 10	4 / 5	3 / 3	

Appendix (1) Instructions for using the Leopold matrix (Henry and Gary, 2009):

1. Identify all actions (located across the top of the matrix) that are part of the proposed project. List the relevant environmental characteristics or conditions down the side of the matrix.

2. Under each of the proposed actions, place a slash at the intersection with each item on the side of the matrix if an impact is possible.

3. Having completed the matrix, in the upper left-hand corner of each box with a slash, place a number from 1 to 10 which indicates the magnitude of the possible impact. The number 10 represents the greatest magnitude of impact, and 1 the least (there are no zeros). Before each number, place + if the impact would be beneficial. In the lower right-hand corner of the box, place a number from 1 to 10 which indicates the importance of the possible impact (e.g., regional versus local); again, 10 represents the greatest importance, and 1 the least.

4. The text that accompanies the matrix should be a discussion of the significant impacts, of those columns and rows with large numbers of boxes marked, and of those individual boxes which have larger numbers.