

Environmental Informatics: Aspects in Society, Economy and Development—A Study

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Abstract

The world is changing and there are numerous and uncountable changes in different sorts and in different sectors and spaces. We all are within the society and this is an important part of the environment. Societal promotion and development is directly related to the overall development of Economical progress or simply the so called 'Development'. In another perspective, this Societal and Economical development can lead to Environmental Development in many contexts. There are different weapons, tools, techniques, procedures in the environmental management and monitoring and among these 'Environmental Informatics' becomes an important name. As far as Environmental Informatics is concerned it is the applications and utilizations of Informatics principles and technologies in environment and natural resource management in a different way. Environmental Informatics is a broad field. It is an interdisciplinary and multidisciplinary knowledge field but practicing in nature. There are lots of areas in which Environmental Informatics can be applied and these ultimately result in societal development and that led to growth in economy and sustainability. This is a theoretical paper and talks about these aspects in brief.

Keyword: Environmental Informatics, Ecology, Environment Management, Agriculture, Development Studies, Sustainability

INTRODUCTION

Environmental Informatics is an interdisciplinary applied science field today due to its combination of Environment (and allied subjects) and Informatics (and allied subjects). Further, it is become a fusion now due to a mixer of different domains and technologies into this. This is practicing by different professionals these days, ranging from—

- ◆ Environmentalist
- ◆ Geologist
- ◆ Geographers
- ◆ Ecologist
- ◆ Marine Scientist
- ◆ Sociologist
- ◆ Anthropologist
- ◆ Informaticist and Information Scientist
- ◆ Oceanographers
- ◆ Climatologist
- ◆ Economist, etc

In Environmental Informatics, there are different tools, techniques and technologies normally incorporated and among these few important are IT Components, Computational Software and Techniques, Statistical Techniques, Management Techniques and Principles, etc.^{[1],[5],[11]}.

Ultimately, the core of this branch is to help in better environmental monitoring, management, ecological development and progress in natural resource management in different sorts.

Objective

As the paper entitled 'Environmental Informatics: Aspects in Society, Economy and Development—A Study' is conceptual in nature, so this paper intends with following aim and objective—

- ◆ To learn about the basics of Environmental Informatics including its background and foundation in brief.
- ◆ To learn about the features, characteristics in brief as far as Environmental Informatics is concerned.
- ◆ To dig out the advantages, roles and functions of Environmental Informatics for environmental and social development and management.
- ◆ To learn about the tools, techniques and technologies which help in better Environmental Informatics practice in brief and their roles for sustainable development.
- ◆ To know about the stakeholders, allied branches of the Environmental Informatics which helps to know about the development perspective of Environmental Informatics in brief.
- ◆ To find out the economical and development related affairs in relation to Environmental Informatics and allied branches in brief.

Environmental Informatics, Allied Branches and Societal Development

Environmental Informatics is an interdisciplinary field and incorporated with different subjects. As far as Environmental part is concerned, it consists with the branches like agriculture, geology, oceanography, climatology, ecology, biology, zoology, soil science, atmospheric sciences, physics, chemistry, etc.^{[2], [3],}

In the other hand, as Informatics is a broad field so that it consists of the allied subjects viz. Computer Applications/ Computing, Information Technology, Information System principles, tools, components and technologies (refer Fig. 1 to learn about allied Green Technologies). Hence, Environmental Informatics is an Applied Science and incorporated with different subjects and disciplines. Environmental Informatics is responsible for different environmental solutions and it takes care of many things but among these few important are includes (but not limited to)—

- ◆ Environmental Informatics helps in planning of energy, environmental and ecological systems and thus it promotes environment ^{[4], [12], [19]}.
- ◆ Environmental decision making with the Simulation, optimization, etc., is permitted with better utilization of Environmental Informatics.

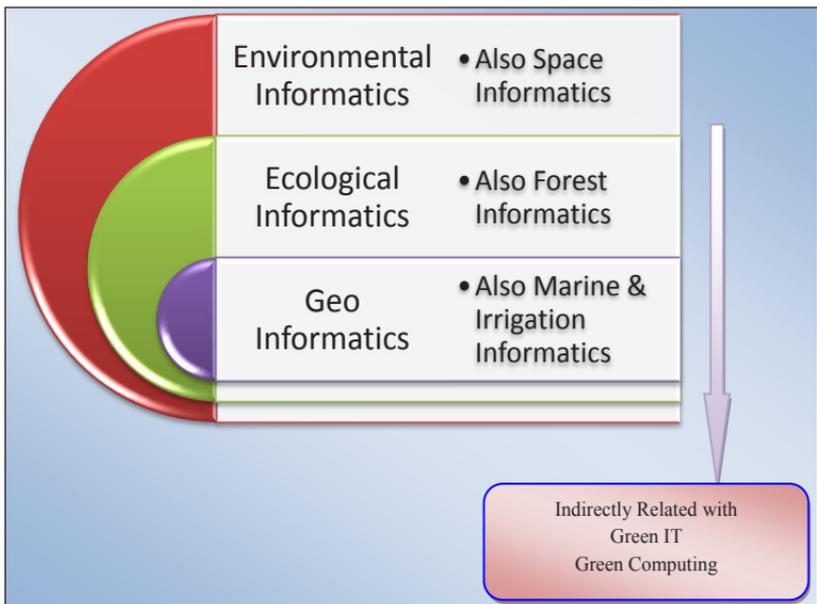


Fig. 1: Green & Eco related Informatics

- ◆ Some of the aspects viz. GIS, Remote Sensing, spatial information technologies are important these days for sustainable development and here Environmental Informatics can be incorporated easily.
- ◆ Environmental chemistry and biochemistry are responsible for various development related activities and in this context Environmental Informatics or allied areas notable.
- ◆ Atomic, molecular and macromolecular scales, etc measurable with the Environmental IT practice and it led the development ^{[6], [7], [16]}.
- ◆ Environmental Informatics supports the designing, developing also modeling of chemical and biological matters which helps in environmental processes are required by.
- ◆ Modeling of biotechnological systems and ultimately its enhanced pollution mitigation and thus it is an important activity that comes from Environmental Informatics.
- ◆ Database tools, multimedia tools, graphics, visualization tools, etc are used for environmental decision support systems and here Environmental Informatics is most important and ultimately helps for sustainable development.
- ◆ Artificial intelligence, expert systems, machine learning, deep learning are useful for environmental, agricultural development with the help of Environmental Informatics practice^{[8], [9], [13]}.
- ◆ With the help of Environmental Informatics few managerial aspects viz. statistics and risk analysis are possible to carry out and that led the development in a different context.

Hence, it is clear that Environmental Informatics is responsible for the development for the society by empowering different sectors and stakeholders (also refer Fig. 2).

- ◇ Agriculture
- ◇ Geology
- ◇ Oceanography
- ◇ Climatology
- ◇ Ecology
- ◇ Biology
- ◇ Zoology
- ◇ Soil science
- ◇ Atmospheric sciences
- ◇ Physics
- ◇ Chemistry
- ◇ Anthropology, etc.

Social enhancement and empowerment are very important for the complete and overall development and as far as Environmental Informatics is concerned it helps direct and indirect helps to reach its goal by different sorts and means^{[1],[12],[17]}.

Sustainable and Economical Development: Environmental Informatics Perspective

Environmental Informatics is responsible for wider aim, objective and responsibilities than other Informatics branches in some context. For example, Health Informatics is responsible for healthcare solutions only, similarly, Design Informatics is about IT solutions in designing of the products and tools. But,

as Environmental Informatics is broader in nature and thus it is responsible for complete environmental solutions in a different context [9], [14], [21].

It is worthy to note that, Environmental Informatics is concerned with different branches that its peers viz. agriculture, geology, oceanography, climatology, ecology, biology, zoology, soil science, atmospheric sciences. And economical development is an important concern for all such branches and all these within Environment. Hence, environmental development means complete development and it leads to holistic development and complete development in a different context.

Economy is the core of any development and it is directly connected with the development of various facets and sectors. The societal development is therefore responsible for economical development. All the branches related to the Environmental Informatics i.e. Ecological Informatics, Geo Informatics, Urban Informatics, Rural Informatics, Social Informatics, Irrigation Informatics, Agricultural Informatics, etc. The Fig. 2 shows the details of the relation of Environmental Informatics with ecological leading to social, economical development at a glance [10], [18].

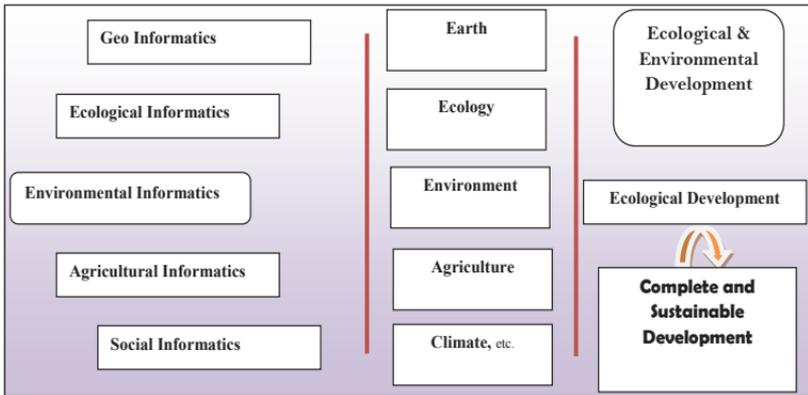


Fig. 2: Environment Informatics & ultimate role in development and economic progress

Challenges, Issues and Suggestions

- ❖ Environmental Informatics is applicable in diverse fields as mentioned in this paper but still, there are many challenges in developing countries; regarding its development.
- ❖ Involvement of Environmental organizations, institutions, NGOs, Government Departments and Ministries are highly solicited in promotion of Environmental Informatics practice.
- ❖ Educational programs in this field are still limited, a very few institutes have started educational programs on this subject. Though there are potentialities to offer this as a Minor and Major at Bachelors, Masters.
- ❖ Environmental Informatics programs could be started at Research level and degrees leading to MPhil, M.Res., PhD, etc., for sustainable development.
- ❖ There is less awareness about the field Environmental Informatics that it is still considered as a branch of technologies only rather considering it as a field for sustainable development.
- ❖ Environmentalists, Geologists, Geographers, Ecologists, Marine scientists, Sociologist, Anthropologists, Oceanographers. Climatologist, Economist and other professionals can get the benefits of Environmental Informatics by different means.
- ❖ Proper funding still limited to this field for its utilization and thus proper financial support and funding should be provided by different sectors and departments.

CONCLUSION

Environmental Informatics and closely associated with

environmental engineering and technology in the recent past. Organizations, government, foundations and associations are closely working with the environment and therefore they can use Information Technology and Computing for wider applications and usages. Different emerging technologies of IT viz. Cloud Computing, Big Data, Analytics, Human Computer Interaction, Usability Systems, 3D and Graphics can be actively engaged in the environment and allied activities and sectors. The development of the society and community thus many ways depend on solid Environmental Informatics and similar domains and field. The Green Computing and Green Information Technologies are few other allied domains also indirectly help in ecological and sustainability in a different context.

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