

Chapter 2

The Need for Environmental Project Management

Having defined in Chap. 1, ‘environment’ as the components of the ecosystems (land, water, and air, including all layers of the atmosphere) to be effectively managed, and discussed the concept of project management as a set of tools and templates required to make this possible, an attempt will now be made to define environmental project management as a new paradigm shift in achieving the goal of sustainable development.

2.1 Environmental Project Management—An Overview

Before examining the specifics of environmental project management, it is worth spending a little time to elaborate on what is meant by an environmental-based project, as distinguished from ‘green’ project (see Fig. 2.1). This is done in the next section.

2.1.1 Environmental-Based Project: A Definition

To distinguish between a ‘green’ project, e.g., managing a road construction project in such a manner that the wetlands are least disturbed, and an environmental-based project, it is essential, first and foremost, to define what is meant by environmental-based project.

In its early stages, project of any kind is a *temporary endeavor* undertaken to initiate and manage. Later, it evolves and becomes part of the routine operation in the organization. Although environmental-based project shares some common ground with other ‘green’ projects that are embedded with environmental aspects (e.g., road construction project, oil and gas project, research and development (R&D)

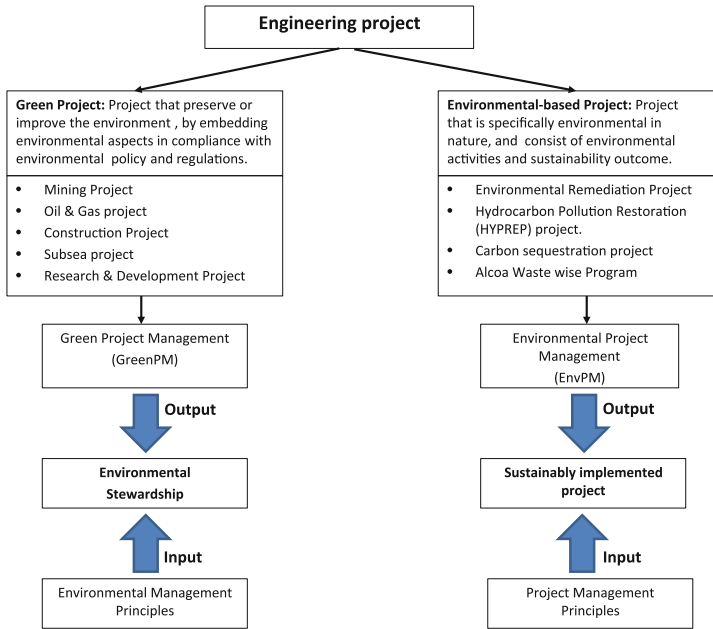


Fig. 2.1 Green project versus environmental-based project

project and mining project), its core difference lies on the fact that it comprises of environmental activities, which are combined together to achieve a sustainable objective of reducing the negative environmental impacts (e.g., oil spills, greenhouse gas emissions, groundwater contamination, etc.). Consequently, it can be said that environmental-based projects are first and foremost environmental in nature. A good example is the Nigeria’s hydrocarbon pollution restoration project (HYPREP), whose main objective was to remediate the environment and restore the coastal wetlands.

An environmental-based project has some key characteristics which distinguishes it from other projects. The most obvious characteristic is that environmental-based project has to achieve a specific environmental objective, e.g. “to cut greenhouse gas emission or reduce industrial waste by 20 % by the year 2020.” Such an undertaking has some key characteristics which signal that it is a project and not a routine activity that is part of the organization’s normal business. As the environmental-based project becomes embedded in the management structure of the organization, it will become a routine operation and part of day-to-day environmental management activity.

2.1.2 Environmental-Based Project Versus Business Operations

Projects and operations complement one another so that an organisation can continually achieve their goals and objectives (see Table 2.1).

Table 2.1 Environmental-based project versus business operations

Environmental-based project	Business operations
• New process, product or system	• Repeat process, product or system
• Has one environmental goal	• Has several goals
• Has a start and finish dates	• Ongoing
• Has a sustainable outcome	• Several outcomes
• Systems are created to integrate efforts, e.g., EMS	• Well-established systems in place to integrate efforts
• Greater uncertainty of performance, cost and schedule	• Greater certainty of performance, cost and schedule
• Outside of the organisation	• Part of line organization
• It implies change	• Implies business as usual

Operational tasks sustain the business and frequently generate income while projects have a specific objective and may only have costs. An outcome or result of a project can become a part of operations upon completion. Operations includes tasks that are repeatable, cyclical, and ongoing, while projects have a defined start and end date, temporary, and provide a unique product, result or service (Burford 2012).

In the environmental industry, with informal processes and controls, and where staff work on business, project and operational tasks concurrently, intermixing business, project and operational tasks can easily occur. The business cycle is a preproject stage during which business opportunities are explored. The environmental project cycle covers the project execution through different environmental project management phases, while the operation cycle covers the use of the project results and represents the benefit stage. The difference between an environmental project cycle and operation cycle, and the effects of an environmental-based project and its output on usual business operations as an ongoing needs of the environment for sustainability is illustrated in Fig. 2.2.

2.1.3 Examples of Environmental-Based Projects in Australia

Projects can be large or small and involve one person, group or thousands of people. They can be done in one week, a month, or take years to complete. Environmental-based projects involve using knowledge, skills, and innovative technology to create a sustainable change in product, service, result or system. Examples of environmental-based projects across Australia include the following:

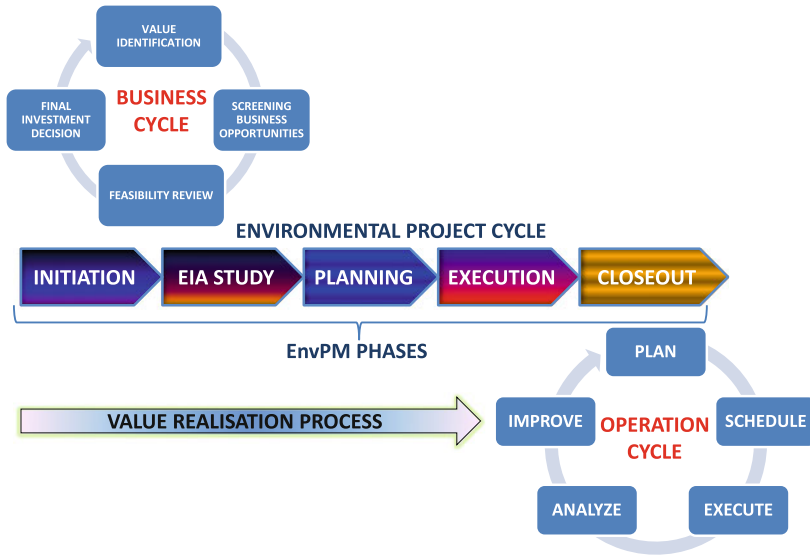


Fig. 2.2 Environmental project cycle in the value realisation process

- **Ten Million Trees program:** Alcoa's response to global climate change. The key objective is to plant ten million new trees by 2020. It is expected that the ten million new trees will absorb more than 250,000 metric tonnes of carbon dioxide per year during their lifetime (Alcoa 2014).
- **CO₂ Reduction Program:** A focused effort to reduce anode effects at the Portland aluminium smelter in Australia, which resulted in an 83 %, or 106,000 tonnes reduction of carbon dioxide equivalent emissions annually and US\$135,000 in maintenance savings each year (Alcoa 2014).
- **Carbon Capture Project:** The Kwinana residue carbon capture plant in Western Australia currently sequester almost 70,000 tonnes of CO₂ a year that would normally be released to the atmosphere—that is the equivalent of taking 17,500 cars off the road (Alcoa 2014).
- **Alcoa Darling Range Water Catchment Program:** Salinity and intermediate rainfall zone mining was designed to protect the quality of water supply catchments in Western Australia (Alcoa 2014).
- **Alcoa Wastewise Program:** A practical and step-by-step approach to minimizing waste and maximizing the efficient use of valuable resources (Alcoa 2014).

In 2007, Alcoa of Australia was the first corporation to register and formally report to the Federal Department of Industry, Tourism and Resources (DITR) on the implementation of the Energy Efficiency Opportunities (EEO) Act 2007 and Greenhouse Challenge Plus programs. With water management being one of Australia's most critical issues, Alcoa of Australia invested \$600,000 in a three year partnership with Murdoch University to establish the Alcoa Chair in Sustainable Water Management in late 2008 (Alcoa 2014).

A key achievement in emissions reduction was seen at Portland Aluminium in 2009. The Carbon Bakes Sustainability Project was implemented in 2008, with full commissioning at the end of quarter one in 2009. This included an 80 % reduction in Polycyclic Aromatic Hydrocarbon (PAHs) emissions from the anode baking process, and a more than 90 % reduction in volatile organic compounds (Alcoa 2014).

Apart from Alcoa, Woodside Petroleum also invested AUS\$100 million in a program with CO₂ Australia to offset carbon emissions from the Pluto reservoir. This investment creates Australia's biggest commercial emissions offset program based on dedicated forest carbon sink planting. The plantings took place over a five year period, which commenced in 2008 (Woodside 2014).

In part IV (Chaps. 18 and 19), case studies of environmental projects from conceptualization to delivery, both in developed and developing countries, are reviewed to demonstrate the approaches to reducing environmental effects in terms of waste reuse and pollution restoration. From the examples provided and case studies reviewed, it can be seen that a wide variety of projects are used by different companies only to demonstrate their *environmental stewardship* or *compliance*, but without proper implementation of environmental project management methodology.

2.1.4 Definition of Environmental Project Management

“No problem can be solved from the same consciousness that created it—A. Einstein”

Environmental project management (EnvPM) is a relatively new term that can have different interpretations. Most people, when asked, would probably say it means just what it says—managing the environment as a project. The fine details of how this is done are of little interest to them. However, to the people working in the field, the term may cover the principles, knowledge areas, the processes, the detailed tools and techniques used to manage specific element of the environment, such as water, air, land and the living organisms. Or they may associate the term with the environmental management systems and processes that are used to guide potential impact of project activities on the environment.

EnvPM should not be confused with green project management (GreenPM)—a term coined by Maltzman and Shirley (2012) and Mochal and Krasnoff (2010) with a goal of incorporating an organization's environmental policies into project management processes (see e.g., Fig. 2.1). Green project management is a model designed for project managers to think ‘green’ throughout the life of a project, and when making decisions that take into account the impact of human activities on the environment.

Environmental project management, on the other hand, is a concept that uses project management principles, methods and processes, to manage and improve an element of the ecosystem, e.g., water, air, plants, land or living organisms, in order to achieve a sustainable outcome (see e.g., Fig. 5.1, p. 97).

The concept can be illustrated as follows:

EnvPM = Environment + Project + Management

EnvPM = Ecosystem—the biological and physical elements of our life

(e.g., water, air, plants, land, and living organisms)

+ a temporary and unique endeavor undertaken to create a sustainable change

+ organizing, coordinating, and controlling an element of the ecosystem.

Environmental project management is a paradigm shift in the way environment should be managed and improved. Thomas (2005) puts it very bluntly when he said:

“humans cannot continue to exploit the environment for resources and as a sink for our wastes, and leave a diverse and vibrant environment for the future generations. Even now, given the way we are drawing down resources (e.g., fossil fuels), diminishing biodiversity, and adding unwanted chemicals to our air and water, serious problems may face current generation. We cannot continue on a ‘business as usual’ plan as in the past. We must take action”.

It is imperative that we, as people, must protect or conserve the environment; and in the alternative, remediate the contaminated sites.

The following definitions of project, project management, and environmental management are useful in developing an environmental project management framework:

1. A project is “a unique endeavor to produce a set of deliverables, in which human, material and financial resources are organized in a novel way, to undertake a unique scope of work, of given specification, within clearly specified time, cost and quality constraints” (Turner 2009; Westland 2006).
2. Project management is the “art and science of planning, organizing, integrating, directing, and controlling all committed resources—throughout the life of a project—to achieve the predetermined objectives of scope, quality, time, cost, and customer satisfaction” (Havranek 1999).
3. Environmental management is the “process of allocating natural and artificial resources so as to make optimum use of the environment in satisfying basic human needs at the minimum, and more if possible, on a sustainable basis” (Jolly 1978).

The definitions provided above raise three important aspects—*time, cost, and quality*—which need to be considered in the establishment of any project, and are particularly pertinent in terms of the development of an environmental project management framework. These three aspects are often called the triple constraints of project management. Throughout the management of the project activities, the relationships between time, cost and quality must be regularly reviewed and trade-offs applied, when necessary to justify priority preference of one constraint over the other. For example, changes to one of the areas (e.g., halving the schedule to produce an environmental impact statement for an environmental project may well save on costs by reducing staff time, but result in poor quality of producing an incomplete environmental impact study).

The third definition, environmental management, is an attempt to integrate project management, environmental management and sustainable development. In addition to delivering projects in accordance with customer satisfaction, as stated in the above definition of project management, environmental project must be performed in accordance with environmental regulatory requirements of the country where the project is being executed. Furthermore, an environmental project must be performed in conformance with the appropriate health, safety and environmental laws, policy and standards to which a particular organization subscribes (in particular, those outlined in AS/NZ 14001, AS/NZ 4801 and BS OHSAS 18001). Finally, an environmental project undertaking must incorporate the sustainability principles, which is “meeting our current needs without compromising the ability of future generations to meet their needs”, that is, the need of sound environment, just society and healthy economy (WCED 1987).

2.1.5 Significance of Environmental Project Management

The advancement of science and technology has mixed blessings. It brought about many benefits to the society but, at the same time, new problems in the disposal and handling of toxic industrial waste, green house gas emissions, underground water, nuclear waste and debris from space has added to the list of environmental pollutants. Every nation has now become aware of the impact of heavy and large scale industrialization on the precious environment in which we have to breathe and live. To safeguard against environmental damage, all nations of the world are enforcing strict environmental laws and regulations on resource exploration and production industries—both in the public and private sectors. However, due to lack of proper surveillance and dishonest practices, a vital aspect of the environment, which could ultimately threaten our very existence is being given the go-by. It has rightly been said that *‘we have not inherited the world from our ancestors but have borrowed it from our descendants’*, and it is our responsibility to ensure that we leave it for them to live in.

In this fast-changing, technology-driven world, any new project proposal must first consider the impact of the project on the environment. The additional costs, time and performance required for adherence to the norms and stipulations of the concerned environmental authorities must be built into the cost and schedule structure of the project.

It is important that environmental strategic programs are integrated into business planning and decisions related to environmental protection, conservation and remediation. Projects should be screened to determine the need for an environmental impact assessment, using various monitoring tools such as remote sensing, geographical information system (GIS), global navigation satellite systems (GNSS), and photogrammetry, discussed in part III of the book, prior to initiating a project.

2.2 Scope and Objective of the Book

As society moves through the twenty-first century, it faces an important challenge: to protect and preserve the Earth's resources, while the society continues to develop economically. The rapid growth and advancement of science and technology that began in earnest with the industrial revolution have taken a toll on the natural environment. Failure to capture, measure, and report environmental project outcomes has cost Australia alone several billion of dollars a year in lost efficiency, repeated errors, and unexploited opportunities.

In order to “meet the needs of the present without compromising the ability of future generations to meet their own needs” (WCED 1987), an integrated set of solutions that include expanding all natural resources, improving efficiency, and minimising environmental impact is required. The field of project management is evolving fast to adapt to the requirements of this new era. Emphasis is placed on critical issues such as greenhouse gas (GHG) emissions, global warming, climate change, groundwater contamination, oil spills, soil, water and air pollution.

Managing an environmental project comes with a unique set of challenges that include how to incorporate environmental impact perspective into project strategy. The challenges also include how to capture, measure, and manage *environmental, economic and social impacts* on project planning documents. Environmental project management addresses these issues for professionals in the private, public and the not-for-profit sectors. It shows them how to plan and track their environmental projects with the professionalism and discipline widely applied to other project investments.

The purpose of this book, therefore, is to both make generally accepted project management knowledge accessible to experts in the technical areas of environmental science and to help improve their performance through increased understanding and sound implementation of environmental project management methods and processes. The overall objective of the book is to introduce a systems approach that integrates environmental management, project management and geospatial techniques into project planning and decision-making processes. Geospatial awareness is essential for implementing and managing a broad portfolio of projects ranging from complex infrastructure projects to pollution abatement and waste management tasks. For effective decision-making, environmental managers require accurate geospatial information with a seamless dataflow.

Underpinning the specific issues associated with effective and efficient environmental impact assessment and monitoring, a proven environmental project management framework is developed to provide project management professionals with a disciplined and structured approach that can be used to analyse and critically evaluate management aspects of environmental projects.

Most projects that are termed “environmental projects” are in essence projects smoked-screened with the term “environment” in order to pass the legislative requirements of a given jurisdiction. This book clearly distinguishes between environmental project management (EnvPM) and green project management (GreenPM); and provides, for the first time, a close-knit amalgamation of environmental management and

project management concepts, using geospatial methods to form an environmental project management concept. This is the key achievement of the book.

This book is divided into four parts. Part 1: setting for environmental project management, consists of two chapters; part 2: principles of environmental project management contains five chapters; part 3: essential tools and techniques for environmental project management includes ten chapters and finally, part 4: case studies on environmental conservation and remediation projects combines three chapters together to discuss the case study of environmental projects in Australia and challenges of applying environmental project management in developing countries.

The work will not make an expert of anyone in any of the subjects upon which it touches. It is intended as an overview to help the reader focus on the environmental issues that are relevant to green house gas emissions, oil spills, diminishing biodiversity, and industrial wastes. The complete work can be used as a handbook for professionals in the private, public and not-for-profit sectors, a valuable resource for students at both undergraduate and Masters levels and an indispensable guide for anyone who wants to develop their skills in modern project management, environmental management and geospatial.

The book is written with an intention to raise the bar on the professionalism with which environmental projects are planned, monitored and measured. It should be understood that this book is not written only for environmental project managers; it provides useful information for any person wishing to enhance their knowledge on project management principles, methods and processes. It is our hope that by reading this book, the reader will have a clearer and firmer grasp of the scope and seriousness of the environmental impact of human and industrial activities on planet, economy, and people.

2.3 Concluding Remarks

With increasing awareness about the need to protect and conserve nature, environmental issue, such as climate change, ozone depletion, loss of biodiversity, natural resource scarcity, and air pollution, is increasingly gaining importance. However, even after the existence of a large number of interdisciplinary courses such as environmental law and policy, environmental management and governance, sustainability and sustainable development, much more is needed to be done to make the subject applied. This chapter explained environmental project management as a key development factor that has a huge capacity to enhance social values, achieve technological advancement and improve economic prosperity without devastating the planet. Success in this field depends largely on one's interests and love towards nature and its awe inspiring processes. Those with an interest in social equity and an intense desire to protect and conserve resources for posterity would especially find this book very appealing.

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