Key knowledge

The principles of sustainability and environmental management

Sustainability can have many connotations; however, in Ecology we consider the long term sustainability of;

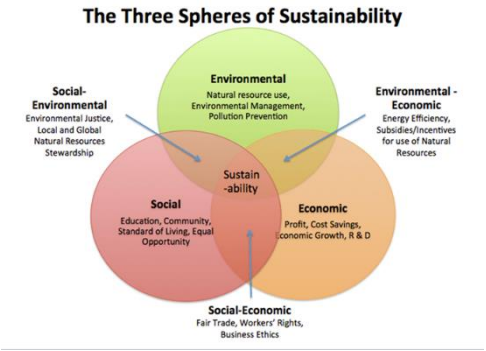
- ✓ the planet
- ✓ the population
- ✓ food security
- ✓ water security
- ✓ efficient energy production

- *assessment of beneficial and harmful impacts on the four Earth systems (atmosphere, biosphere, hydrosphere, lithosphere) of one selected environmental science project*

- *comparison of definitions of sustainability including distinction between sustainability and ecologically sustainable development*

'Sustainability is an ability or capacity of something to be maintained or to sustain itself." What happens when only 2 out of the 3 pillars are achieved?

– Social + Economic = Equitable
– Social + Environmental = Bearable
– Economic + Environmental = Viable



True sustainability must consider all 3 pillars. Ecological sustainability generally only considers the one.

Brundtland Commission in 1987, who documented the sustainable development definition as:

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

- *sustainability principles: intergenerational equity, intra generational equity; conservation of biodiversity and ecological integrity; user pays principle; efficiency of resource use; precautionary principle*

Sustainability principle	Definition
Conservation of biodiversity and ecological integrity	*Maintenance of the abundance of different species living within a particular region, the genetic diversity in a population and the ability of an ecosystem to maintain its biotic and abiotic organisation and function in the face of changing environmental conditions, including a capacity for self-renewal*
Efficiency of resource use	*Use of smaller amounts of physical resources to produce the same product or service while minimising environmental impact*
Intergenerational equity	*Development that takes into account its impact on the opportunities for future generations*
Intra generational equity	*Equity between people of the same generation including considerations of distribution of resources and justice between nations*
Precautionary principle	*When there is substantial scientific uncertainty about the risks and benefits of a proposed activity, policy decisions should be made in a way that errs on the side of caution with respect to the environment and the health of the public*
User pays principle	*Calls upon the user of a service or resource to pay directly for the amount they use, rather than the cost being shared by all the users or a community equally*

- *challenges to sustainability: population, food, water, energy*

The main challenges to sustainability are;

1) The exponential growth in human population
2) Growing energy demands (due to growing population and shifting from rural to urban living)
3) Growing demand for food
4) Availability of fresh water

- *management of the project: length of time for project, planned targets, regulatory frameworks that limit management plans*

EMS: Environmental Management Systems - that part of the overall management system which includes organisational structure, planning, activities, responsibilities, practices, procedures, process and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy. (AS/NZS ISO 1400: 1995)

EIA - A decision making tool required which determines the environmental effects of a construction or project prior to it's implementation. The Commonwealth tool for an EIA is the Environment (Protection) Impact of Proposals Act 1974.

The object of the Act is to ensure, to the greatest extent that is practicable, that matters affecting the environment to a significant extent are fully examined and taken into account in relation to Commonwealth actions and decisions.

EIA(National) while EES (Victoria)

- *stakeholder involvement: role of the community, media, environmental interest groups, non-government and government agencies in encouraging responsible environmental practices and identification of values systems that affect decision-making*

Stakeholders are any individuals, groups bodies, organisations, industries or businesses that will be impacted upon by a development. (see Woori Yallock Development case study)

- *techniques for monitoring the project: historical and current data comparisons as measures of effectiveness of management strategies*

In order to minimise potential risks that might arise during a project there are a range of tools or processes that can be utilised that come under the banner of Environmental Management Systems. Environmental management tools and strategies including:

- ✓ Environmental Management Systems
- ✓ Waste Minimisation
- ✓ Life Cycle Analysis *(see class notes)*
- ✓ Environmental Impact Assessment *(see above)*
- ✓ Environmental Risk Assessment *(see above)*

Application of environmental management tools and strategies to ensure ecological sustainability of the environment and the enhancement of environmental health.

- *response to change: impact minimisation, risk management, and application of new technologies.*

Impact minimisation can be predicted by a Life Cycle analysis of the product. Life cycle analysis (LCA) aims to quantify all environmental impacts from the production of a particular product over the course of the products lifetime. LCA provides information during the decision making by assessing the impacts of energy used, materials required and waste disposal.

Risk assessment is a necessary requirement when a new product, project or activity is being planned or considered. Risk management is a formulated method to anticipate potential harmful consequences to determine the planning and management strategies required to either remove the risk entirely or if not possible, to minimise the impact of such perceived risk.

The best way to manage risk and minimise harm is to implement preventative measures, or reasonable steps, to ensure things don't go wrong.

Table 1: Steps in controlling hazards and risks

Step	Action	Description
1	Identify hazards	What hazards are present that might cause harm
2	Assess risks	What is the level or severity of risk, based on likelihood and consequence
3	Implement controls	What measures are suitable and available to the business to eliminate or reduce a risk
4	Check controls	Review controls to ensure they are effective

In a risk matrix, likelihood and consequence are given relative scores which can be matched on the matrix to give a risk rating from low to extreme.

HAZARD RISK ASSESSMENT MATRIX

	Hazard Categories			
Frequency of Occurrence	1 Catastrophic	2 Critical	3 Serious	4 Minor
(A) Frequent	1A	2A	3A	4A
(B) Probable	1B	2B	3B	4B
(C) Occasional	1C	2C	3C	4C
(D) Remote	1D	2D	3D	4D
(E) Improbable	1E	2E	3E	4E

Unacceptable High Medium Low