

Module 6 Lesson 1 - Introduction to Engineering and LDCs

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G.1.1. The Least Developed Countries

- In 2018, 783 million people live on less than US\$ 1.90 > half that in the year 2000
- Most of these people live in 47 countries designated as the Least Developed Countries (LDC)
- LDC
 - > low-income countries
 - > vulnerable to economic and environmental shocks
 - > have low levels of human assets

Afghanistan (1971)	Malawi (1971)
Angola (1994)	Mali (1971)
Bangladesh (1995)	Mauritania (1986)
Benin (1971)	Mozambique (1988)
Bhutan (1971)	Myanmar (1987)
Burkina Faso (1971)	Nepal (1971)
Burundi (1971)	Niger (1971)
Cambodia (1991)	Rwanda (1971)
Central African Republic (1975)	Sao Tome and Principe (1992)
Chad (1971)	Senegal (2000)
Comoros (1977)	Sierra Leone (1982)
Democratic Republic of the Congo (1991)	Solomon Islands (1991)
Djibouti (1981)	Somalia (1971)
Eritrea (1994)	South Sudan (2017)
Ethiopia (1971)	Sudan (1971)
Gambia (1975)	Timor-Leste (2003)
Guinea (1971)	Togo (1982)
Guinea-Bissau (1981)	Tuvalu (1986)
Haiti (1971)	Uganda (1971)
Kiribati (1986)	Tanzania (1971)
Laos (1971)	Vanuatu (1985)
Lesotho (1971)	Yemen (1971)
Liberia (1971)	Zambia (1991)
Madagascar (1991)	

> 3 Criteria:

- Human Assets
- Economic vulnerability
- Income per capita

• Human Assets

- Secondary School Enrollment
- Under-nourishment
- Maternal mortality
- Adult literacy
- Under-five mortality

• Economic Vulnerability

- Population
- Remoteness
- Export Concentration
- Victims of natural disasters
- Share of agriculture and fishing in GDP
- Share of population in coastal zones
- Instability of exports
- Instability of agriculture

- Share of population in coastal zones
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- Instability of agriculture
- Income per Capita (2015)
 - US\$ 1242 (threshold)
- To meet LDC designation, must meet 2 out of 3 criteria at two 3-yearly reviews
- 5 Graduates:
 - Botswana
 - Cabo Verde
 - Equatorial Guinea
 - Maldives
 - Samoa
- Scheduled to leave: (2011)
 - Angola
 - Vanuatu
- All LDCs have duty- and quota-free access to EU
- Special treatment for WTO members
- Climate change financing
- Reduced UN contributions
- Help with travel to international meetings

6.1.2 The Humanitarian Engineer

- Humanitarian Engineers are
 - altruistic
 - creative
 - possess engineering know-how
 (according to Ken Banks)

6.1.3 Humanitarian Engineering Examples

- Access to Clean Water (Malawi)
 - locating broken water wells
- Looking at monitoring & evaluation instead of traditional practice to increase water supply
- Building on something that exists already

6.1.4 Wicked Problem

- Sustainability Problems
 - tend to be ill-structured, highly complex, have multiple possible solutions
 - Also tend to be
 - unique
 - symptom of another problem
 - never-ending
- These "hard-to-define" problems are often called "wicked"

- Humanitarian Engineering Projects are very very "wicked"
- For these problems, engineers now use
 - interdisciplinarity
 - systems thinking
 - iterative thinking
- Another example:
 - water shortage in Jordan
 - 2001 annual demand: $\sim 1505 \text{ m}^3$ annually
 - currently solved by over-exploiting ground water
 - water supply restricted by agreement b/w Jordan, Israel, Lebanon, Syria
 - > 1955 Jordan Unified Water Plan

G.1.5 Ethical Frameworks

- Who should receive benefits?
- Who should provide benefits?
- Are there winners and losers in providing benefits?
- Who determines who needs what and when?

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- Ethics of Care \longrightarrow interdependence of all individuals, offer extra consideration for vulnerable communities
- Non-Maleficence and Beneficence \longrightarrow Avoid needless harm/injury that arises through acts of commission/omission. (Negligence)
Beneficence \longrightarrow actions that promote well-being of others
- Ethical Pluralism \longrightarrow Many theories about what is right or wrong which may be incommensurable with your own personal moral norms
 \rightarrow Working w/ other societies, deciding whether it is appropriate to act under one norm or another
- Feminism \longrightarrow Collaborative work, consultation, dialogue, democratic processes in decision-making
 \rightarrow Information sharing, teaching one another, constant learning

G.1.6 Facing Failure

2010 - Failure Report (EWB)