SUSTAINABLE DEVELOPMENT GOALS

17 GOALS TO TRANSFORM OUR WORLD

Models for Bioenergy , Drought, Desertification & Climate change nexus in Egypt within the meaning of SDGs

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Preface;

Some Related Socioeconomic indicators:

- Egypt total land area is 1 Million Km^2 .
- 97 % of the total area is hyper arid desert, which totally exposed to Drought and desertification disasters.
- Only 4% of the total area is occupied by 90 million people, representing more than 1.16% of the world total population. In another word one person of every 86 people of the plant is a resident of Egypt.

Cont., Some Related Socioeconomic indicators :

- **Water Crisis:** Egypt has a very limited water resources never exceed than 58.3 million cubic meter annually.
- The water crises was magnified by the rapid population growth together with the pollution and it leaves no chance for the use of water as a source for generating electric power by any means possible.
- **The Energy Crisis:** At present these factors combined together along with the limited natural resources of the fossil fuels led to the intense pressure on the socio-economic levels.

- Despite large energy production potential, Egypt has become dependent on hydrocarbon imports due to the structural increase in domestic consumption and the stagnation of investment.
- The negative consequences are substantial: a deteriorating trade balance, swelling budget deficit and disrupted economic activity. Recent support from the oil producing countries has helped reduce short-term pressures.
- Thereafter, reforms will be needed to make investment in Egypt's energy sector more attractive.

All these factors together made the shift into renewable energy strategy is essential; the overall target was set to reach 20% of the total electricity generated by 2020 including 12% wind, 6% hydro and 2% solar.

AVAILABLE WATER RESOURCES DISTRIBUTION IN EGYPT

- **Surface Water Resources**
  - Nile Water → 55.5×10^9 m³/ year
  - Wadis Runoff → 1.0×10^9 m³/ year
- **Non Convential Resources**
  - Agriculture Drainage Water → 7×10^9 m³/ year
  - Desalination Water → 0.06×10^9 m³/ year
  - Treated Sewage Water → 1.1×10^9 m³/ year
- **Ground Water Resources**
  - Renwable → 6.5×10^9 m³/ year
  - Seasonal → 2.5×10^9 m³/year
  - Non Renwable → 0.6×10^9 m³/year

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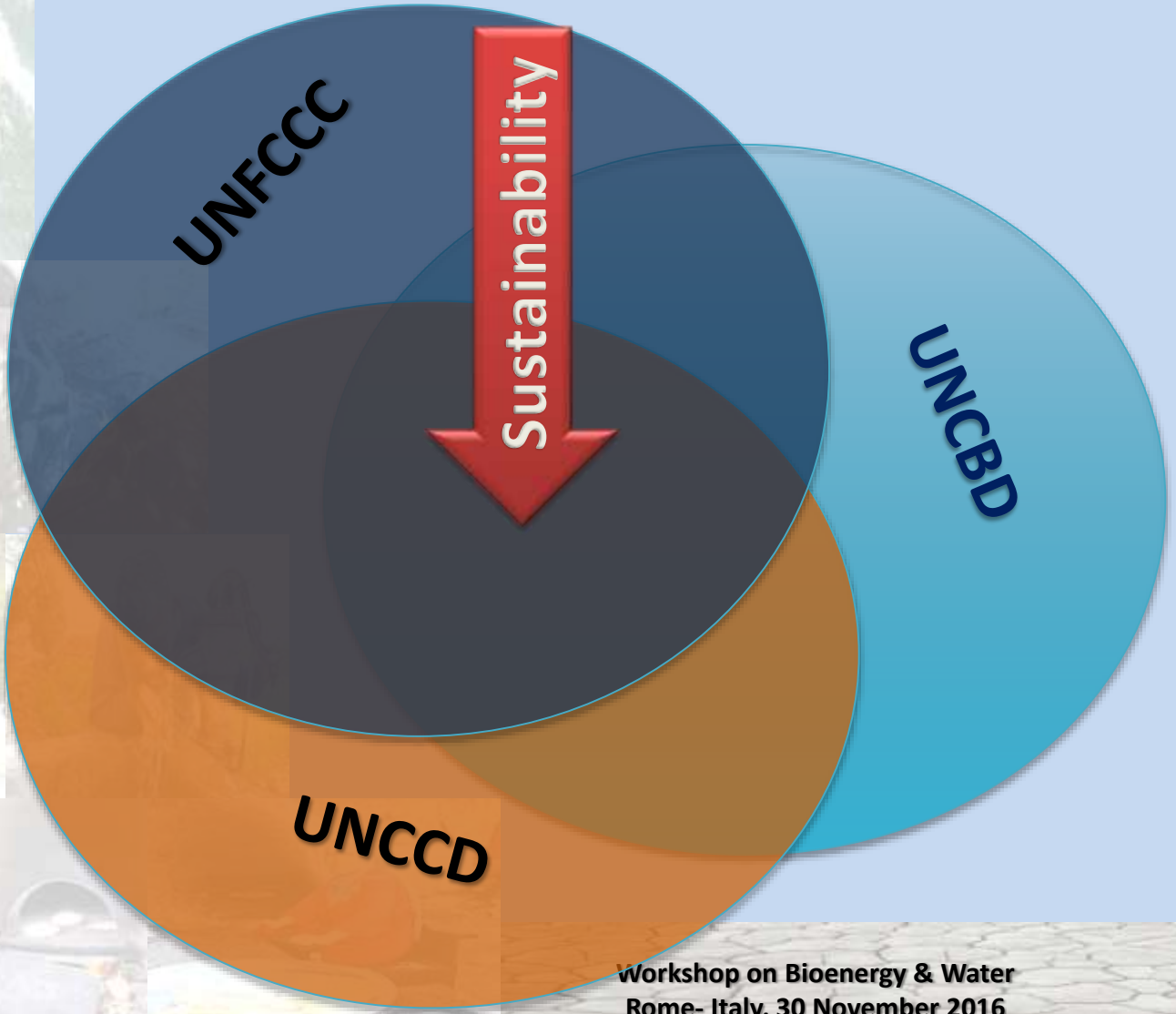
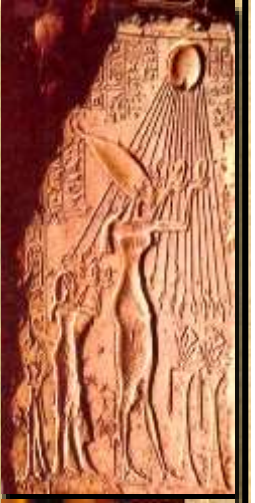
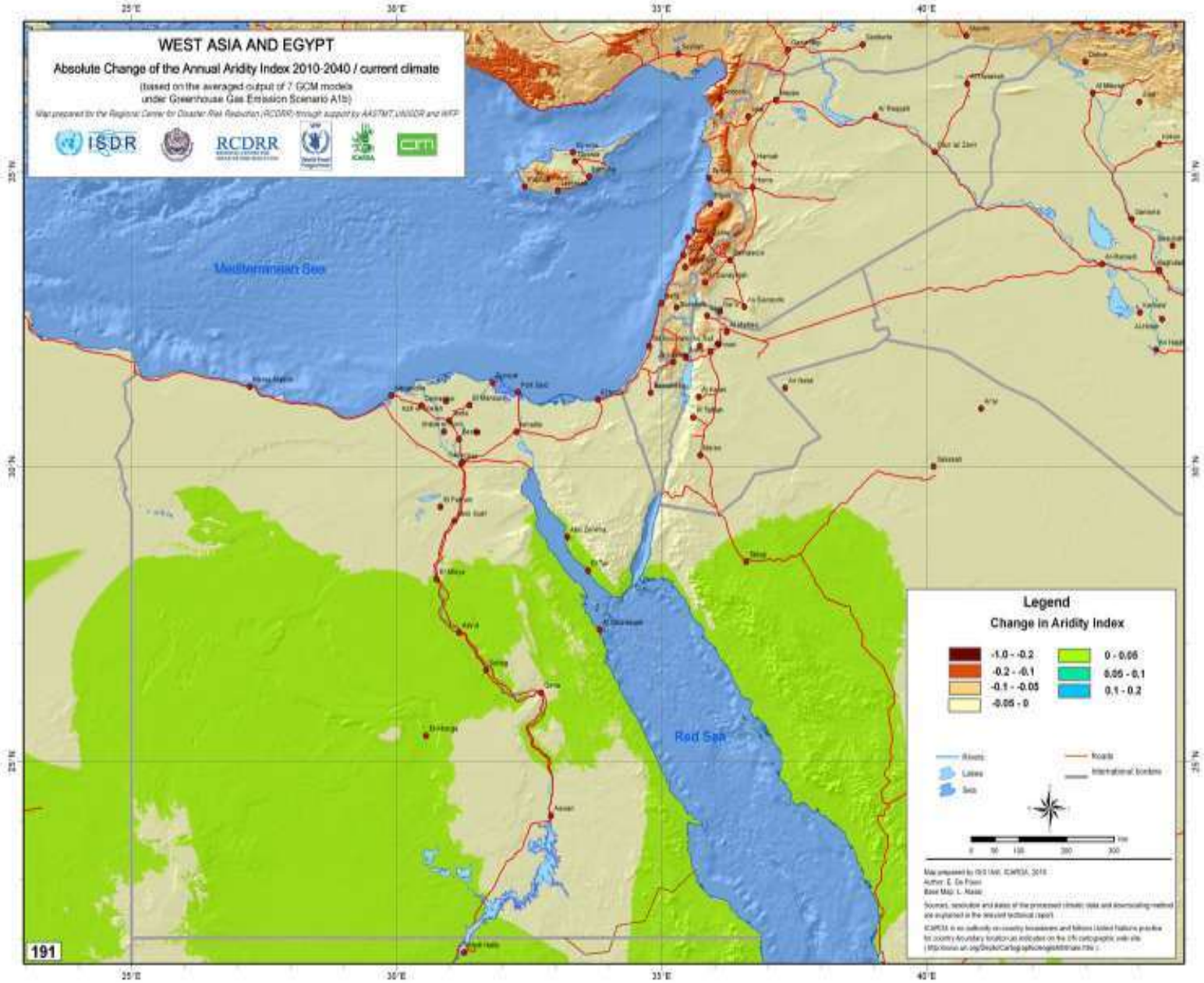
UNCCD, UNFCCC & UNCBD nexus



What is drought ?

- Drought is an insidious hazard of nature.
- It is often referred to as a "creeping phenomenon" and its impacts vary from region to region.
- Drought can therefore be difficult for people to understand. It is equally difficult to define, because what may be considered a drought in, say, Bali (six days without rain) would certainly not be considered a drought in Egypt (annual rainfall less than 100 mm).
- In the most general sense, drought originates from a deficiency of precipitation over an extended period of time--usually a season or more--resulting in a water shortage for some activity, group, or environmental sector.
- Its impacts result from the interplay between the natural event (less precipitation than expected) and the demand people place on water supply, and human activities can exacerbate the impacts of drought.
- Because drought cannot be viewed solely as a physical phenomenon, it is usually defined both conceptually and operationally.





ARIDITY INDEX IN EGYPT

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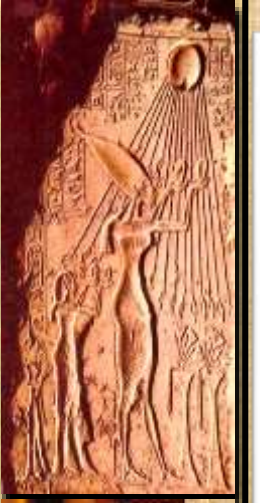
1

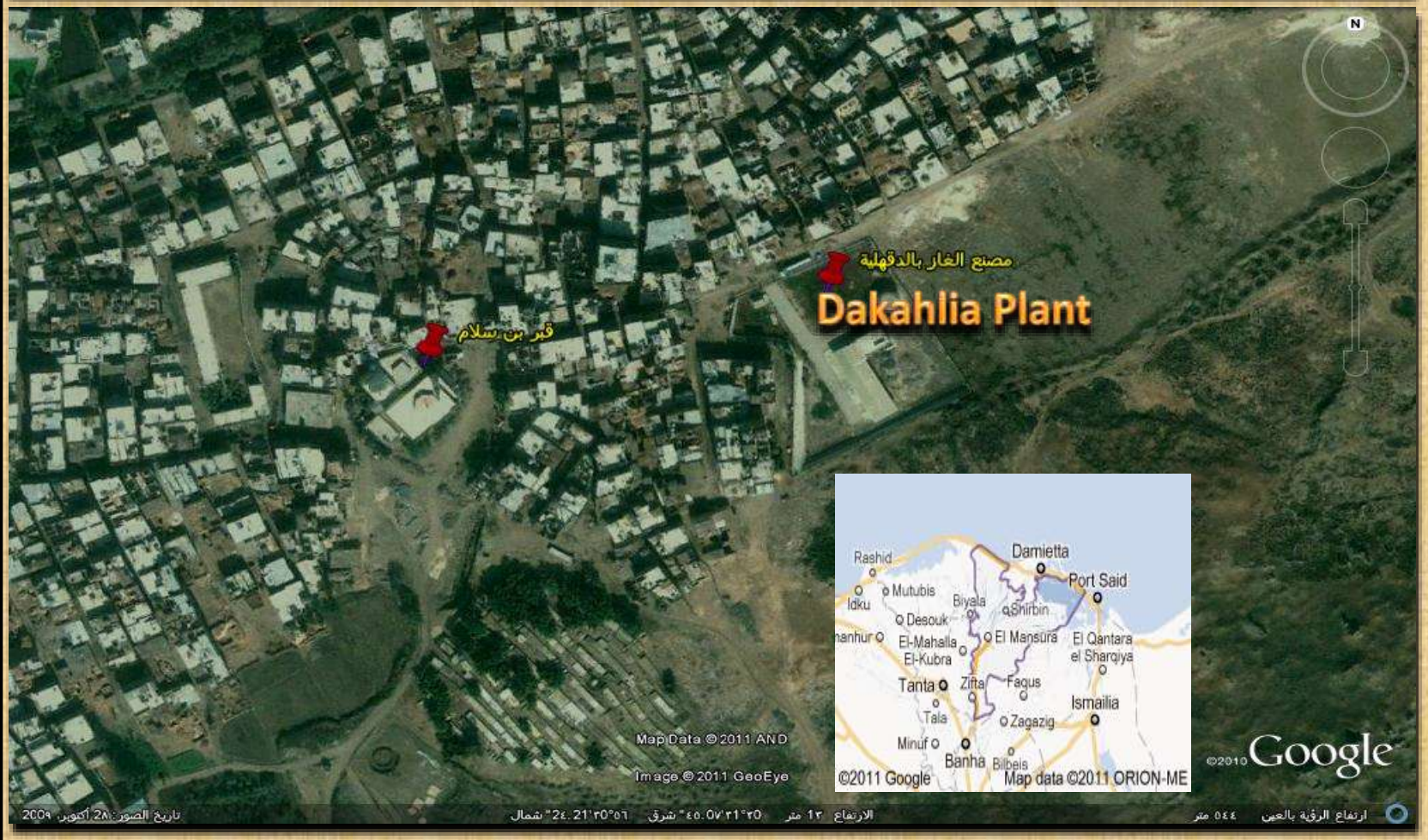
In Nile Delta, Northern zone of Egypt, Pyrolysis method was used to produce the Thermal Gas from rice straw and other agricultural wastes to prevent burning it in open air emitting thousands of mega tons of CO_2 into the atmosphere and causing Global Warming in main Cities.

THE BLACK CLOUD IN EGYPT



LPG CRISIS IN EGYPT

The Thermal Gas Plant In Dakahlia

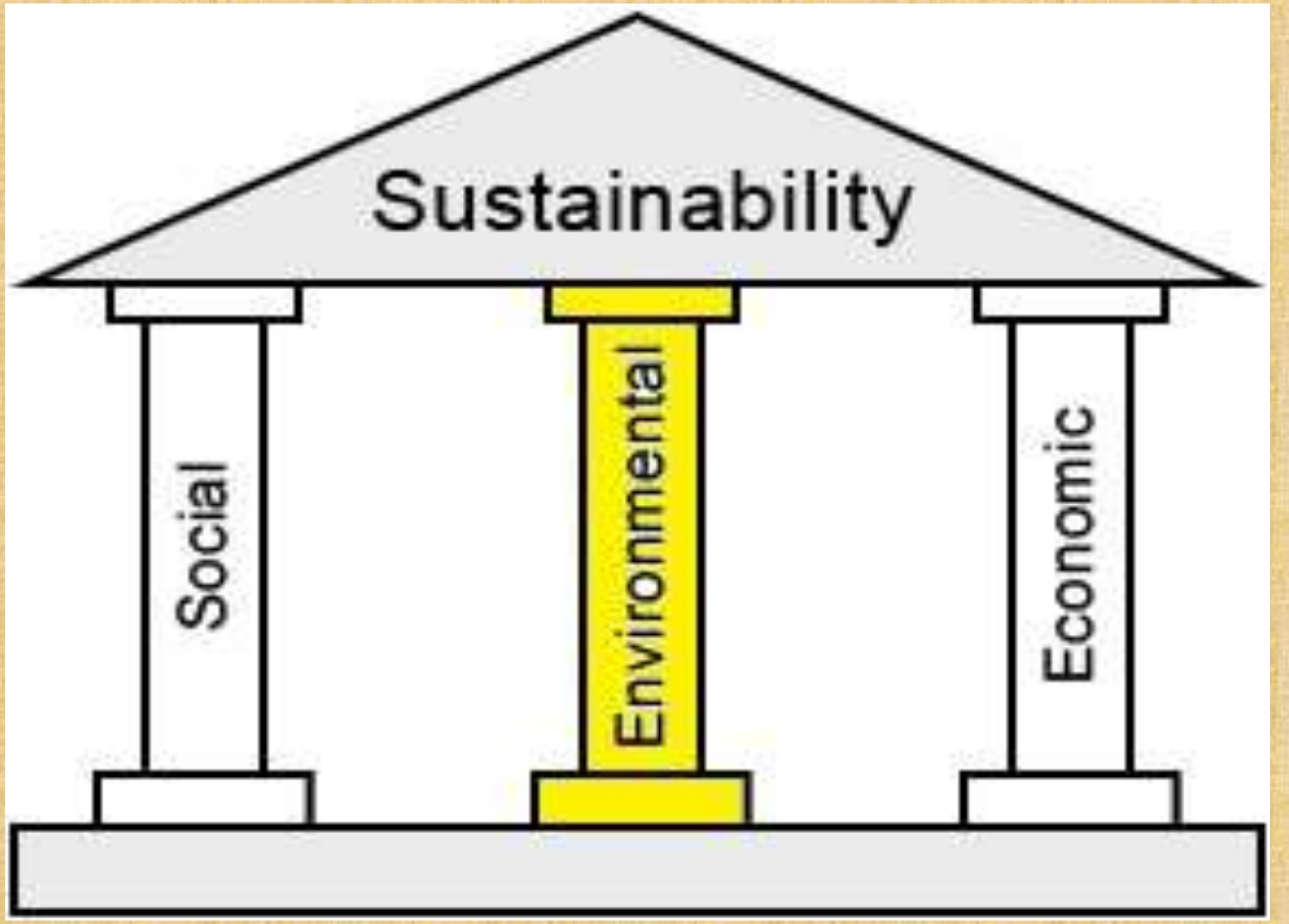


Thermal Gas Generation in Dakahlia Plant

Thermal Gas Generation in Dakahlia Plant

The chemical properties' of the produced gas:

- Nitrogen 41 %
- Carbon monoxide 27 %
- Methane 13 %
- Hydro carbonate 4 %
- Other gases 15 %

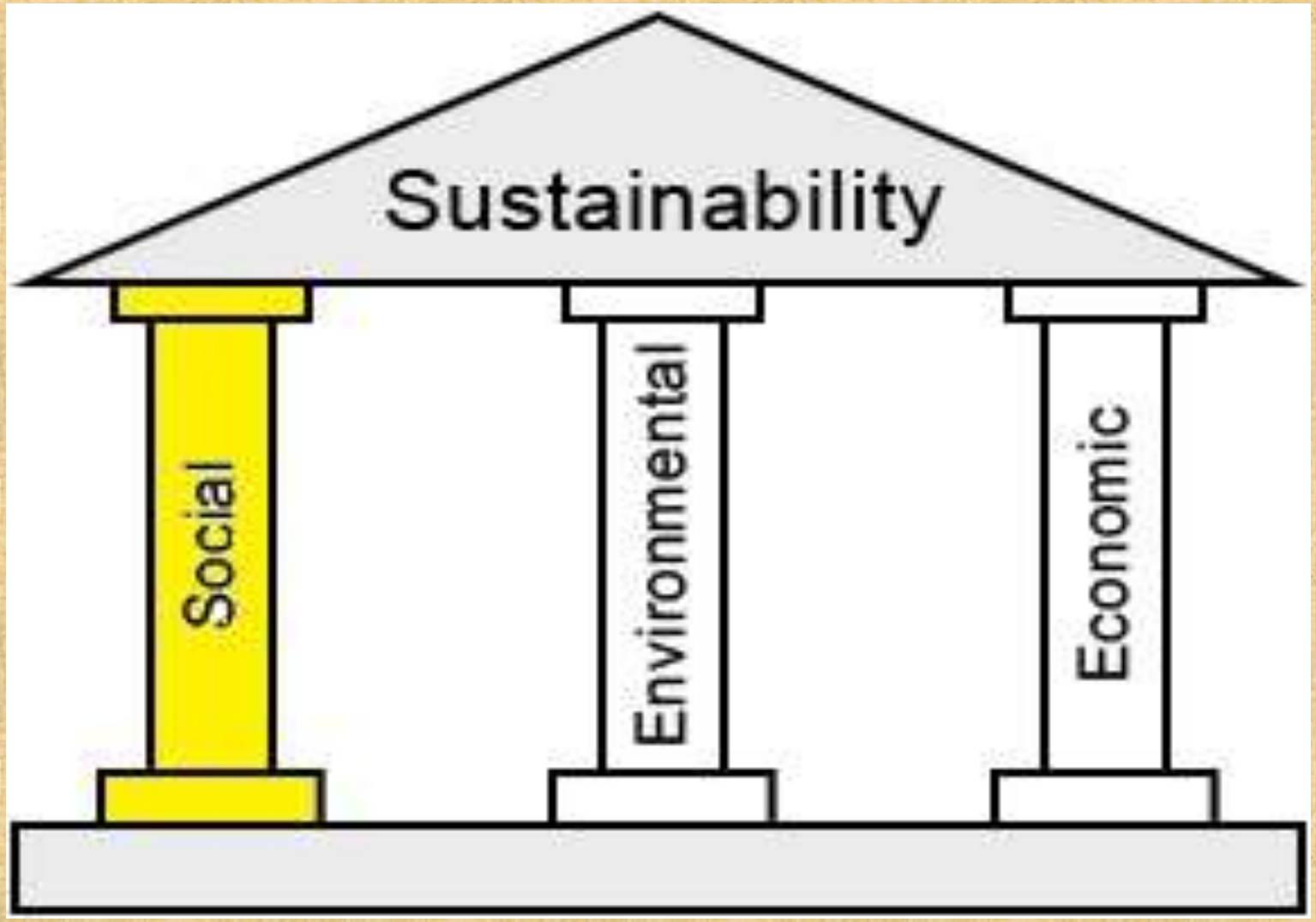

Sustainability
Social
Environmental
Economic



The Environmental Pillar

- Three indicators were found to be relevant to this case study, while the rest of indictors were found to be less relative, or data is not available:

1. Lifecycle GHG emissions: (% of CO_2 reduction after the project).(Very Relative). (30% less)
2. Soil Quality : (% of Organic Carbone restored in the soil).
   (Very Relative).farmers use the biochar produced as byproduct from the technology as a soil amendment.
3. Emissions of non-GHG air pollutants, including air toxics.
   (Very Relative) as degree of the air purity and visibility .


Sustainability
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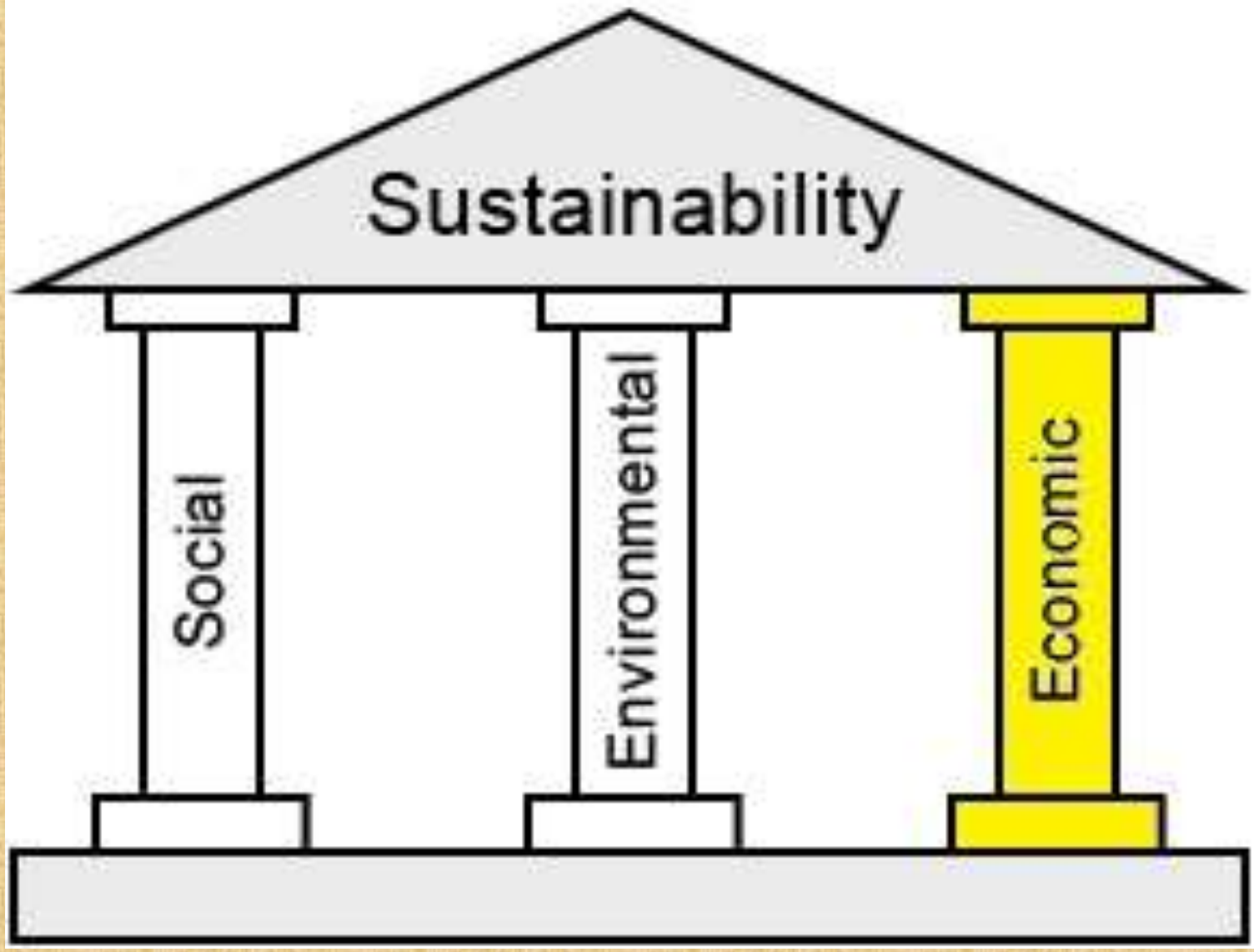
Economic

The Social Pillar

- Three indicators were found to be relevant to this case study (11, 12 & 15) , while the rest of indictors were found to be less relative, or data is not available:
  1. Change in income: (relative); % of family income directed to energy consumption (Minimized to reach zero)
  2. Jobs in the bioenergy sector: (relative); % of workers in the field of bioenergy in relation to labor force in the same age.
  3. Change in mortality and burden of disease attributable to indoor smoke. (relative); % of change in cases per year.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The Economic Pillar

- Two indicators were found to be relevant to this case study (20 & 21) , while the rest of indictors were found to be less relative, or data is not available:
  1. Change in consumption of fossil fuels and traditional use of bioenergy: (relative); families decreased their consumption form LPG significantly. (Minimized by 50%)
  2. Training and re-qualification of the work force: (relative);
     % of workers in the field of bioenergy in relation to labor force in the same age. (number of workers that took part in the survey)

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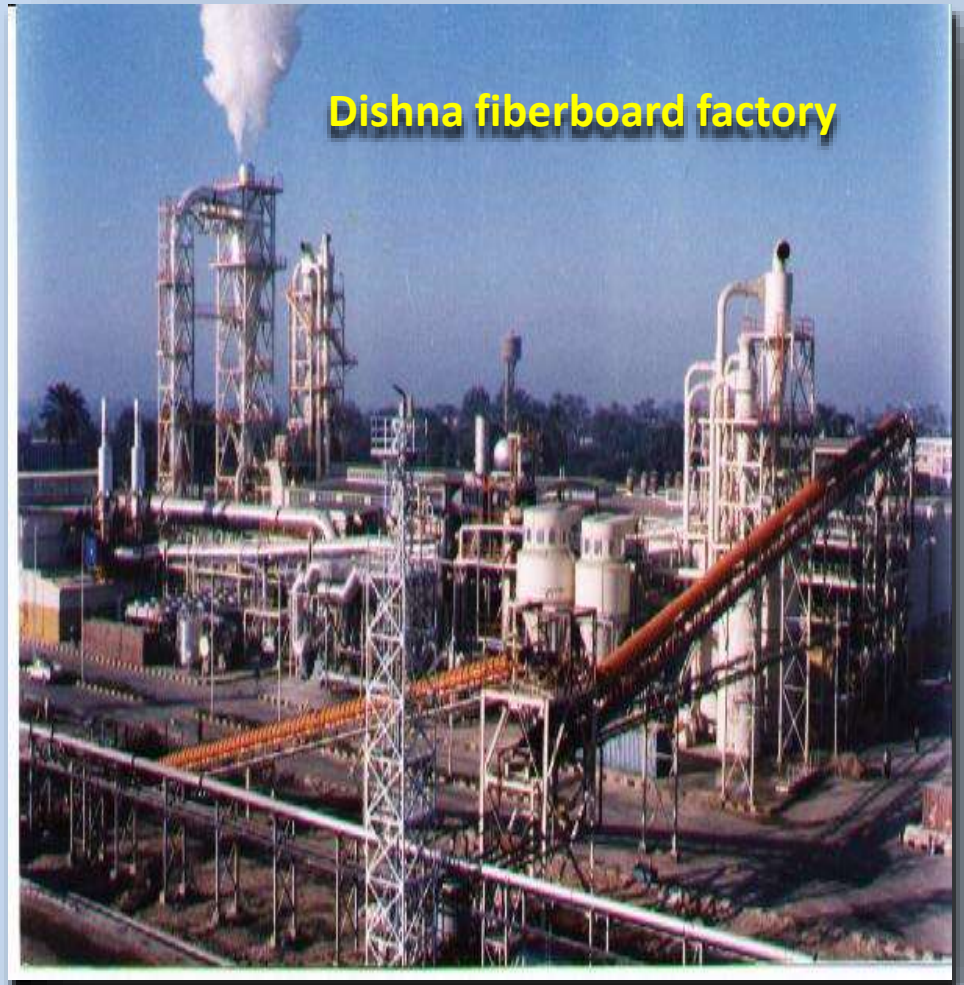
2

In upper Egypt, Sesbania shrubs were grown on the bio-remediated industrial drainage water as a bio-drainage tool, main steam for MDF manufacturer and the secondary branches and leaves were sent to the sugar plant beside bagasse to generate electricity .

Dishna sugar and fiberboard factories



Location:

Dishna City – Qena Governorate - Upper Egypt

The bagasse moistening water and bio-remediated industrial drainage were used to irrigate the Sesbania forest to conserve the fresh water in the Nile Basin.

3. Prevention and criminalization of discharging the untreated industrial drainage into the Nile Basin. (Environmental Law 4/2004)


EM


EM

4. Using the growing shrubs as a bio-drainage tool, main steam for MDF manufacturer and the secondary branches and leaves were sent to the sugar plant beside bagasse to generate electricity .

Positive impacts for water quality:

- The quality of the industrial drainage water were improved to be a valuable fertigation source.
- The fresh water in the Nile basin was conserved from pollutants.

Water quality indicators	Irrigation water quality		
	Untreated Industrial Drainage water	EM-Bioremediation Industrial Drainage water	Nile water
BOD (mg/l)	105 a	3.7 b	2.17 c
COD (mg/l)	208 a	12 b	5.7 c
pH. (units)	9.4 a	7.3 b	7.0 c

*Means having similar letters in the same row are not statistically differed at P≥0.05.

Positive impacts for water availability:

- The water quantity that consumed during the industrial process were reduced almost by 50% , by the mean of conserving the fresh water for the agricultural and the domestic usage.

- The industrial drainage was reused for translocation & moisturization of bagasse.
- Thus the quantity of water which remained for the Municipal usage were increased.

Positive impacts for soil quality:

- The soil properties of the experimental forest were improved significantly and had positive impacts on plant and soil water relations, thus conserve the irrigation water.
  - Soil texture was improved.
  - Soil water holding capacity.
  - Organic matter content.

STEPS FORWARD

- Some important subjects should be included (world wide case studies) such as;
  - Bio-Energy & Land Degradation Neutrality nexus.
  - Bio-Energy & Bio diversity conservation nexus.
  - The linkage between UNCCD, UNCBD and UNFCC under the umbrella of Bio-Energy should be highlighted.


Thank you