Emission Scenarios within the Integrated Assessment Framework

Session IV

EGM on Assessing Climate Change Impacts on Water Resources and Socio-Economic Development in the Arab Region, 06-07 July 2011, UN-ESCWA, Beirut

George J. Nasr,
UN-ESCWA SDPD-WRS
Outline: Emissions Scenarios

Within the IA Framework:

A. Climate
B. Global Climate Trends
C. The Role of GHG’s
D. Global Emissions Scenarios:
   - SRES
   - RCP
Climate: What defines it

• Biophysical systems:
  – Interactions between:
    • “Physical” systems: atmosphere, oceans, surface…
    • “Biological” systems: trees, plankton…

• Socio-Economic systems:
  – Human economic interactions
  – Their resulting actions on various biophysical systems.
The Climate:

- Before mid-20th Century: “Oscillate” in a relatively stable manner, with little variation from cycle to cycle.
- After mid-20th Century: Warming from oscillation to oscillation

While the weather of a given day cannot be predicted in the far future, the change in prevailing future climate trends can be forecasted with relative accuracy.

GHG’s and Radiative Forcing

Methodological Framework for Integrated Assessment
The Effect of GHG’s

Natural Effects + Human GHG Emissions

Only Natural Effects: No Human GHG Emissions

• Work “forward”:
  – From a set of socio-economic changes
  – Obtain a given set of “forcings”
The RCP Emission Scenarios

- Intended to work “backwards”:
  - From assuming forcings of a given magnitude,
  - To the circumstances that result in such forcings.

- No assumptions on socioeconomic projections:
  - The net radiative forcings resulting from those assumptions must arrive at a value in W/m²
    - Related to a given concentration of CO₂-Equivalent

<table>
<thead>
<tr>
<th>Radiative Forcing</th>
<th>GHG Concentration (CO₂-Equivalent)</th>
<th>Pathway Shape</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCP8.5 &gt;8.5 W/m² in 2100</td>
<td>1370</td>
<td>Rising after 2100</td>
</tr>
<tr>
<td>RCP6 ~6 W/m² at stabilization after 210000</td>
<td>850</td>
<td>Stabilization after 21000</td>
</tr>
<tr>
<td>RCP4.5 ~4.5 W/m² at stabilization after 21000</td>
<td>650</td>
<td>Stabilization after 21000</td>
</tr>
<tr>
<td>RCP3-PD peak at ~3W/m² before 21000 and then decline</td>
<td>490</td>
<td>Peak at 2100 and decline afterwards</td>
</tr>
</tbody>
</table>
**RCP Emission Scenario Families**

**Methodological Framework for Integrated Assessment**

**May 26, 2011**

**CO₂e: 1370 ppm, rising after 2100**

**CO₂e stabilizes after 2200 RCP8.5**

**CO₂e stabilizes after 2100 RCP6**

**CO₂e peaks before 2100**

**RCP3-PD**

**CO₂e: 490 ppm, decreasing after 2100**

**CO₂e: 650 ppm**

**CO₂e: 850 ppm**

Focus = Implications of Radiative Forcing


May 26, 2011 **Methodological Framework for Integrated Assessment** Fig. 10, p.21
The Integrated Assessment Model


The Arab Region

Impact Assessment

Vulnerability Assessment

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