An Integrated View of Water, Energy and Food (WEF) Security

Presentation #1

June 1, 2015

Dimple Roy
Water-Energy-Food Security: A growing concern

• “A rapidly rising global population and growing prosperity are putting unsustainable pressures on resources.
• Demand for water, food and energy is expected to rise by 30-50% in the next two decades, while economic disparities incentivize short-term responses in production and consumption that undermine long-term sustainability.
• Shortages could cause social and political instability, geopolitical conflict and irreparable environmental damage.
• Any strategy that focuses on one part of the water-food-energy nexus without considering its interconnections risks serious unintended consequences.”

Water-Energy-Food Security: A global risk
Water is consumed for drinking and growing. Quality is impacted by fertilizer use and animal waste.

Water drives power turbines.

Energy powers water pumps and has thermal impacts on water.

Energy powers agriculture equipment and refrigeration.

Water for drinking and agriculture are consumed by energy security.

Agriculture consumes fuel and electricity, and food waste can be converted into fuel.

Water-Energy-Food Security: Interconnections
Water distribution systems
Typical Sources of Water

Surface Water

Groundwater

Rainwater Harvest

Imported

De-salinized Water

Storage Water
Energy Production and Distribution Cycle

Fuel Sources

Fuel extraction

Fuel Generators

Distribution Systems
Typical Sources of Energy

- Electricity Grid
- Renewable
- Biomass

- Propane (natural gas)
- Diesel, Petrol
Natural Food Cycle

Primary production

Secondary production

Consumption
Typical Sources of Food

Self-produced (subsistence)  Purchased locally (and grown locally)

Imported
WEF Security for a Community

Scale: Regional

Scale: National

Scale: Global
## The WEF Framework

<table>
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<tr>
<th>Framework for Water, Energy and Food Security</th>
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<tbody>
<tr>
<td>Security</td>
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<tr>
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</tr>
<tr>
<td>Availability</td>
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<td>Access</td>
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<tr>
<td>Supporting Infrastructure</td>
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<td>Supporting Institutions and Policies</td>
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Source: IISD (2013)
WEF System Management

Engagement and Assessment

I. Status and linkages
II. Potential mining benefits and impacts
III. Actions to realize benefits and mitigate impacts

Indicators and Monitoring

Security Components
- Availability
- Access
- Supporting Infrastructure
- Supporting Institutions and Policies

## WEF Security Framework

### Security

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### Engagement and Assessment

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<thead>
<tr>
<th>Status and linkages</th>
<th>Potential mining benefits and impacts</th>
<th>Actions to realize benefits and mitigate impacts</th>
<th>Summary for Decision-makers</th>
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<tr>
<td>2. WEF Inventory (Sources, Uses)</td>
<td>6. Mining WEF Inventory (source, Uses)</td>
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<td>3. WEF Status (current)</td>
<td>7. Mining WEF Influence</td>
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<td>4. WEF System Diagram</td>
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### Indicators and Monitoring

## Mining Phases

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<th>Exploration</th>
<th>Development</th>
<th>Operation</th>
<th>Closure</th>
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<tbody>
<tr>
<td>7-10 yrs</td>
<td>5-10 yrs</td>
<td>5-30 yrs</td>
<td>2 – 10 yrs</td>
</tr>
<tr>
<td>Prospecting</td>
<td>Detailed Drilling</td>
<td>Commissioning</td>
<td>Shut-Down</td>
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<tr>
<td>Detailed Exploration</td>
<td>Environmental Studies</td>
<td>Training</td>
<td>Decommissioning</td>
</tr>
<tr>
<td>Drilling Exploration</td>
<td>Detailed Engineering Plans</td>
<td>Production</td>
<td>Reclamation</td>
</tr>
<tr>
<td>Environmental Work</td>
<td>Permitting</td>
<td>Expansion</td>
<td>Post-Closure</td>
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Water Distribution Systems
Energy Production and Distribution Cycle

Fuel Sources

Fuel extraction

Fuel Generators

Distribution Systems
WEF Influences - Mine Benefit/Impact

Availability
- ↓ Water pollution (heavy metals, silt, ARD)
- ↑ ↓ Competition for WEF
- ↑ Market value

Access
- ↑ Purchasing power
- ↑ Aid
- ↓ Self-production risk to resources
- ↓ Bartering
WEF Influences - Mine Benefit/Impact

Supporting Infrastructure

- ↑ Built systems: Schools, roads, power lines, etc.
- ↓ Natural systems: wetlands, veg. cover, stream habitats

Supporting Institutions/Policies

- ↑ Training and education
- ↑ Safety enforcement
- ↑↓ Climate change adaptation
- ↓ Disaster recovery and risk management
- ↑ RDI