The Korean Government's Drought Management Policy

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Speaker

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Publications


• United nations open GIS initiative: The first year of activities. GEAM. GEOINGEGNERIA AMBIENTALE E MINERARIA. Vol.151(2). 2017

• Comparison of cityGML and indoorGML—a use-case study on indoor spatial information construction at real sites. Spatial Information Research. Vol. 23(4). 2015

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Drought in Korea
Drought in Korea

- 65% of territory is covered with mountains.
- Precipitation is concentrated in the summer season from June to September (flood season).

- Difficult to secure water resource due to a rapid slope of stream.
Drought in Korea

• In recent, the frequency of drought is nearly **doubled**.
  - Prior to 2000 (1904 to 2000), drought occurred 36 times in an annual average, but it became 72 times after 2000 (2001 to 2018).

• The duration of drought also **increased more than three times** in the central region
  - The annual average number of normal drought days was **13 days** in the 1970s and **48 days** since 2010.

- Drought frequency and duration are increasing.
- The number of precipitation days decreases.
Drought Definition and Types

• Drought is defined as a shortage of rainfall that lasts for a long time and seriously damages the crops, resulting in loss of production.

• Droughts can be defined separately as meteorological (climatological), hydrological, agricultural, and socio-economic droughts.
  - **Meteorological (climatological) drought** refers to the damage caused by seasonal lower than average levels of meteorological water resources such as precipitation and evapotranspiration.
  - **Hydrological drought** refers to damage caused by lack of surface water and groundwater such as dams, reservoirs, and rivers.
  - **Agricultural drought** is the damage caused by lack of soil moisture required for crop growth.
  - **Socioeconomic drought** refers to damages caused by lack of living water, industrial water, and agricultural water demand and supply.
Drought Governance Structure of Korean Government
## Government Department for Each Drought Type

<table>
<thead>
<tr>
<th>Drought Type</th>
<th>Government Department</th>
<th>Major Responsibility</th>
<th>Legal Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socioeconomic Drought</td>
<td>Ministry of the Interior and Safety (MOIS)</td>
<td>- Managing Governance&lt;br&gt;- Measures for Drought Relief</td>
<td>- ENFORCEMENT DECREE OF THE FRAMEWORK ACT ON THE MANAGEMENT OF DISASTERS AND SAFETY&lt;br&gt;- COUNTERMEASURES AGAINST NATURAL DISASTERS ACT</td>
</tr>
<tr>
<td>Meteorological (climatological) Drought</td>
<td>Korea Meteorological Agency (KMA)</td>
<td>- Weather Forecast&lt;br&gt;- Special Report</td>
<td>- Weather ACT</td>
</tr>
<tr>
<td>Hydrological Drought</td>
<td>Ministry of Environment (MOE)</td>
<td>- Monitoring Drought Status&lt;br&gt;- Manage a facilities for underground water resource</td>
<td>- River ACT&lt;br&gt;- Sewerage ACT&lt;br&gt;- ACT ON THE INVESTIGATION, PLANNING, AND MANAGEMENT OF WATER RESOURCES</td>
</tr>
<tr>
<td>Agricultural Drought</td>
<td>Ministry of Agriculture, Food &amp; Rural Affairs (MOAFRA)</td>
<td>- Support Local Farmhouse&lt;br&gt;- Support Expenses</td>
<td>- ACT ON THE PREVENTION OF AND COUNTERMEASURES AGAINST AGRICULTURAL AND FISHERY DISASTERS</td>
</tr>
</tbody>
</table>
The National Law Information Center is the Korean representative legal information web site where all the law information can be searched.

You can search the law, click ‘Law Title’ or ‘Law Context’, and then enter ‘search keyword’.

Source: http://www.law.go.kr/LSW/eng/engMain.do
## Four Levels of Drought Warning

<table>
<thead>
<tr>
<th>Drought Warning Level</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level 1</strong> (Weak Drought)</td>
<td>• Meteorological Drought&lt;br&gt;• Agricultural Drought&lt;br&gt;• Living and Industrial Drought</td>
</tr>
<tr>
<td><strong>Level 2</strong> (Normal Drought)</td>
<td>• Meteorological Drought&lt;br&gt;• Agricultural Drought&lt;br&gt;• Living and Industrial Drought</td>
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<tr>
<td><strong>Level 3</strong> (Severe Drought)</td>
<td>• Meteorological Drought&lt;br&gt;• Agricultural Drought&lt;br&gt;• Living and Industrial Drought</td>
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<tr>
<td><strong>Level 4</strong> (Extreme Drought)</td>
<td>• Meteorological Drought&lt;br&gt;• Agricultural Drought&lt;br&gt;• Living and Industrial Drought</td>
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# Drought Forecast・Warning Criteria for Meteorological Drought

<table>
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<tr>
<th>Drought Warning Level</th>
<th>Drought Forecast・Warning Criteria</th>
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<tr>
<td><strong>Level 1</strong> (Weak Drought)</td>
<td>- <strong>Meteorological water</strong>: The weak drought warning will be issued if the value of Standard Precipitation Index (SPI) with an accumulated precipitation during the last six months is lower than -1.0 (about 65% in a normal year) and it is forecasted to continue. (Regional precipitation will be considered in auxiliary).</td>
</tr>
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<td><strong>Level 2</strong> (Normal Drought)</td>
<td>- <strong>Meteorological water</strong>: The normal drought warning will be issued if the value of the SPI is lower than -1.5 (about 55% in a normal year) and it is forecasted to continue. (Regional precipitation will be considered in auxiliary).</td>
</tr>
<tr>
<td><strong>Level 3</strong> (Severe Drought)</td>
<td>- <strong>Meteorological water</strong>: The severe drought warning will be issued if the value of the SPI is lower than -2.0 (about 45% in a normal year) and it is forecasted to continue. (Regional precipitation will be considered in auxiliary).</td>
</tr>
<tr>
<td><strong>Level 4</strong> (Extreme Drought)</td>
<td>- <strong>Meteorological water</strong>: The extreme drought warning will be triggered if the value of the SPI is lower than -2.0 (about 45% in a normal year) and it lasts more than 20 days.</td>
</tr>
</tbody>
</table>
e.g. Meteorological drought changes in 2017 by Korea Meteorological Agency

- Meteorological drought area in a summer season is larger than ones in other seasons.
e.g. Meteorological drought
by *Hydrological Weather Drought Information System*
of Korea Meteorological Agency

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<th>Warning Level</th>
<th>Drought Forecast · Warning Criteria</th>
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<tr>
<td>Level 1 (Weak Drought)</td>
<td>SPI is lower than -1.0 and it is forecasted to continue.</td>
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<td>SPI is lower than -1.5 and it is forecasted to continue.</td>
</tr>
<tr>
<td>Level 3 (Severe Drought)</td>
<td>SPI is lower than -2.0 and it is forecasted to continue.</td>
</tr>
<tr>
<td>Level 4 (Extreme Drought)</td>
<td>SPI is lower than -2.0 and it lasts more than 20 days.</td>
</tr>
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</table>

Source: [http://hydro.kma.go.kr/droughtFcst/obsAdmAll.do](http://hydro.kma.go.kr/droughtFcst/obsAdmAll.do)
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<td><strong>Level 1 (Weak Drought)</strong></td>
<td>o <strong>Agricultural water</strong>: The weak drought warning will be issued if an annual average rate of water storage during farming periods is less than 70% (Paddy) and chresard is less than 60% in the farming season (Field).</td>
</tr>
<tr>
<td><strong>Level 2 (Normal Drought)</strong></td>
<td>o <strong>Agricultural water</strong>: The normal drought warning will be issued if an annual average rate of water storage during farming periods is less than 60% (Paddy) and chresard is less than 45% in the farming season (Field).</td>
</tr>
<tr>
<td><strong>Level 3 (Severe Drought)</strong></td>
<td>o <strong>Agricultural water</strong>: The severe drought alarm will be issued if an annual average rate of water storage during farming periods is less than 50% (Paddy) and chresard is less than 30% in the farming season (Field).</td>
</tr>
<tr>
<td><strong>Level 4 (Extreme Drought)</strong></td>
<td>o <strong>Agricultural water</strong>: The extreme drought alarm will be issued if an annual average rate of water storage during farming periods is less than 40% (Paddy) and chresard is less than 15% in the farming season (Field).</td>
</tr>
</tbody>
</table>
e.g. Agricultural Drought Changes in 2017
provided by Ministry of Agriculture, Food & Rural Affairs
## Drought Forecast ・ Warning Criteria for Hydrological Drought

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<th>Drought Warning Level</th>
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<tbody>
<tr>
<td><strong>Level 1</strong> (Weak Drought)</td>
<td>- <strong>Living and Industrial water</strong>: The weak drought warning will be issued when the water level of rivers and water facilities is lower than usual, and you need to prepare for drought like managing the amount of living and industrial water in order to supply water normally.</td>
</tr>
<tr>
<td><strong>Level 2</strong> (Normal Drought)</td>
<td>- <strong>Living and Industrial water</strong>: The normal drought warning will be issued when the flow rate of the river is insufficient to maintain the river because the water level of the river and water facilities is low or it is required to restrict the supply of water from dams and reservoirs for river maintenance.</td>
</tr>
<tr>
<td><strong>Level 3</strong> (Severe Drought)</td>
<td>- <strong>Living and Industrial water</strong>: The severe drought warning will be issued when there is a need to restrict the use of river and agricultural water supply because there is a shortage of living and industrial water in the rivers and water facilities or there is concern about the shortage.</td>
</tr>
<tr>
<td><strong>Level 4</strong> (Extreme Drought)</td>
<td>- <strong>Living and Industrial water</strong>: The extreme drought warning will be issued when the lack of living and industrial water from rivers and water facilities has led to restrictions on supply of living and industrial water in rivers, dams, reservoirs, etc.</td>
</tr>
</tbody>
</table>
e.g. Hydrological Drought Changes by Ministry of Environment

Hydrological drought (shortage of living and industrial water)
Drought Information Services

provided by the four drought-related ministries of Korea
Information Systems to respond drought

Ministry of the Interior and Safety

*Disaster Safety Portal: Drought Alarms*

Source: [http://www.safekorea.go.kr](http://www.safekorea.go.kr)

Ministry of Agriculture, Food & Rural Affairs

*Agricultural Drought Management System (ADMS)*


Ministry of Environment

*National Drought information-Analysis Center*


Korea Meteorological Agency

*Hydrological Weather Drought Information System*

Source: [http://hydro.kma.go.kr/front/intro.do](http://hydro.kma.go.kr/front/intro.do)
Ministry of the Interior and Safety (MOIS)

Disaster Safety Portal: Drought Forecast & Alarms

- Publish drought forecast every month.

Ministry of Agriculture, Food & Rural Affairs (MOAFRA)

**Agricultural Drought Management System (ADMS)**

operated by Korea Rural Community Corporation under Rural Development Administration

Source: http://adms.ekr.or.kr/main/main.do
Ministry of Environment (MOE)

**National Drought Information-Analysis Center** (KNDIC) operated by K-water in charge of national water resource.

Source: http://drought.kwater.or.kr/main.do
Korea Meteorological Agency (KMA)

Hydrological Weather Drought Information System

Precipitation per Basin

Drought Indexes

Press monitoring

Source: http://hydro.kma.go.kr/front/intro.do
Instructions to Korean Government and Citizens

depending on the level of drought warning
## Government Response for Agricultural Drought

<table>
<thead>
<tr>
<th>Drought Warning Level</th>
<th>Government Response</th>
</tr>
</thead>
</table>
| **Level 1 (Weak Drought)** | ○ Joint TF of related government departments (MOIS)  
○ Manage drought such as monitoring rainfall and water storage rate (MOAFRA)  
○ Measures to secure water in water-shortage areas (MOAFRA)  
○ Water Saving Promotion and Education (MOAFRA) |
| **Level 2 (Normal Drought)** | ○ Joint TF of related government departments (MOIS)  
○ Manage drought-prone areas (MOAFRA)  
○ Equipment preparation, maintenance (MOAFRA)  
○ Establish a support plan & costs for drought mitigation and restoration (MOAFRA)  
○ Water Saving Promotion and Education (MOAFRA) |
| **Level 3 (Severe Drought)** | ○ Joint TF of related government departments (MOIS)  
○ Special grant tax support and review for drought measures (MOIS)  
○ Support costs for drought mitigation and restoration (MOAFRA)  
○ Reservoir filling, water supply directly to irrigation canal (MOAFRA)  
○ Development of water sources like reservoir and pumping station (MOAFRA) |
| **Level 4 (Extreme Drought)** | ○ Operating central disaster & safety countermeasures headquarters (MOIS)  
○ Special grant tax expand and review for drought measures (MOIS)  
○ Support costs for drought mitigation and restoration (MOAFRA)  
○ Reservoir filling, water supply directly to irrigation canal (MOAFRA)  
○ Development of water sources like reservoir and pumping station (MOAFRA) |
# Government Response for Living & Industrial Drought

<table>
<thead>
<tr>
<th>Drought Warning Level</th>
<th>Government Response</th>
</tr>
</thead>
</table>
| **Level 1 (Weak Drought)** | - Joint TF of related government departments (MOIS)  
- Monitoring supply and demand status of major water resource (MOE)  
- Meeting for joint-operation of water resources like dams, reservoirs (MOE)  
- Minimize reserved quantity of living & industrial water in dam (MOE) |
| **Level 2 (Normal Drought)** | - Joint TF of related government departments (MOIS)  
- Operating room of control water supply and demand (MOE)  
- Check alternative facilities for emergency water supply (MOE)  
- Meeting for joint-operation of water resources like dams, reservoirs (MOE)  
- Minimize reserved quantity of living & industrial water in dam (MOE) |
| **Level 3 (Severe Drought)** | - Joint TF of related government departments (MOIS)  
- Special grant tax support for drought mitigation (MOIS)  
- Water Saving Promotion and Education (MOE)  
- Operating room of control water supply and demand (MOE)  
- Joint-operation of water resources like dams, reservoirs (MOE)  
- Reduce water supply for agriculture purpose (MOE)  
- Restrict a use of river water partially (MOE) |
| **Level 4 (Extreme Drought)** | - Operating central disaster & safety countermeasures headquarters (MOIS)  
- Special grant tax expand and review for drought measures (MOIS)  
- Operation of Central Accident Prevention Headquarters (MOE)  
- Water Saving Promotion and Education (MOE)  
- Joint-operation of water resources like dams, reservoirs (MOE)  
- Reduce water supply for living and industrial purpose (MOE)  
- Supply water reserved for emergency (MOE)  
- Restrict a use of river water partially (MOE) |
# Citizen Instructions to Respond Agricultural Drought

<table>
<thead>
<tr>
<th>Drought Warning Level</th>
<th>Citizen Instructions</th>
</tr>
</thead>
</table>
| **Level 1** (Weak Drought) | - Water-saving cultivation like vinyl covering  
- Cleaning waterways like cleaning irrigation and drainage canal  
- Build a water-conservation plan |
| **Level 2** (Normal Drought) | - Check facilities to draw water or equipment for pumping water like hose, water pump and Irrigation ditch  
- Drainage  
- Water saving  
- Implement the water-conservation plan |
| **Level 3** (Severe Drought) | - Compile Citizen Instructions on Level 2  
- Development of water source like wells for areas where water supply is insufficient  
- Close a paddy sluice |
| **Level 4** (Extreme Drought) | - Compile Citizen Instructions on Level 3  
- Supply water by drawing underground water or river around.  
- Stop/delay rice-planting or planting alternative crops |
# Citizen Instructions to Respond Living & Industrial Drought

<table>
<thead>
<tr>
<th>Drought Warning Level</th>
<th>Citizen Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level 1</strong> (Weak Drought)</td>
<td>◦ Check for wasted water</td>
</tr>
</tbody>
</table>
| **Level 2** (Normal Drought)| ◦ Check for wasted water  
 ◦ Conserve water at home, school, etc.  
 (Using cups and dishwashers, reducing shower time, etc.) |
| **Level 3** (Severe Drought)| ◦ Check for wasted water  
 ◦ Action to conserve water at home, school, etc.  
 (Using cups and dishwashers, reducing shower time, etc.)  
 ◦ Install/use water-saving equipment  
 ◦ Using rainwater and recycled water |
| **Level 4** (Extreme Drought)| ◦ Check for wasted water  
 ◦ Action to conserve water at home, school, etc.  
 (Using cups and dishwashers, reducing shower time, etc.)  
 ◦ Install/use water-saving equipment  
 ◦ Using rainwater and recycled water  
 ◦ Participate actively in the request of governments to overcome national drought like restriction of water supply |
Conclusion
Conclusion
The Korean Government's Drought Management Policy

Thank you.

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