UNESCO – Water Family Webinar
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National Water Security: Problems and Challenges Scoping

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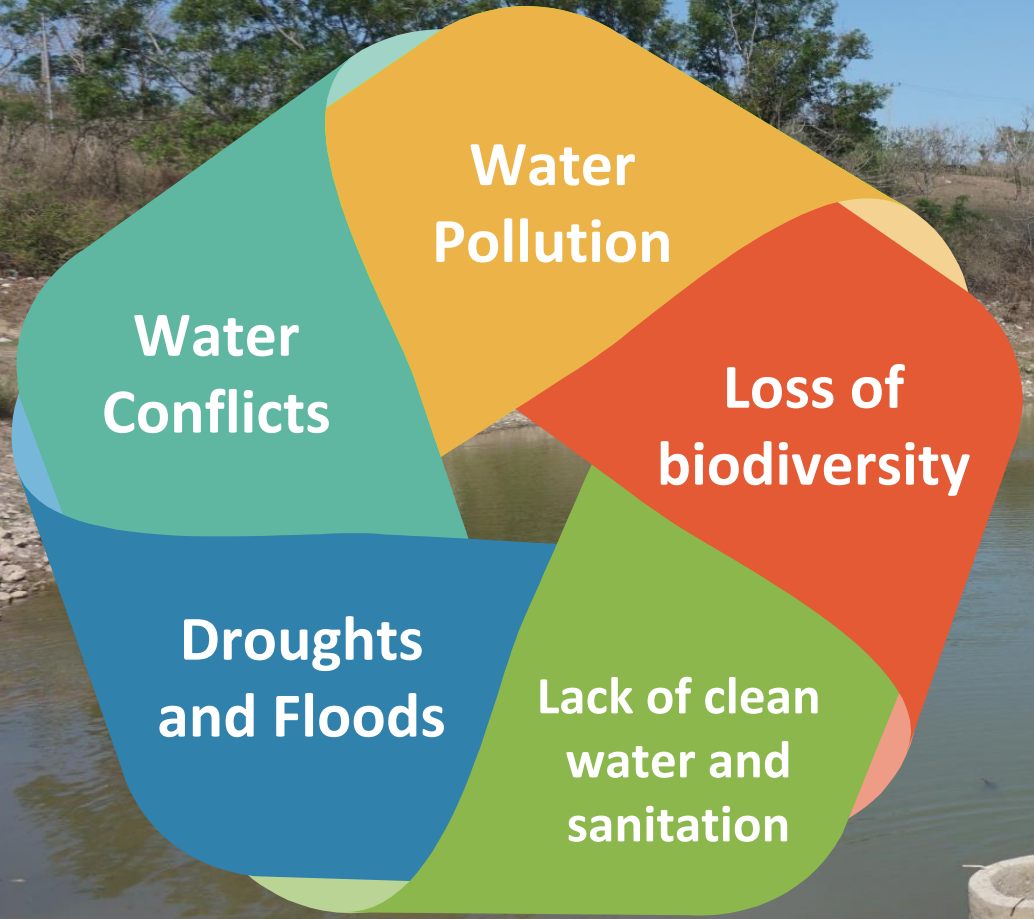
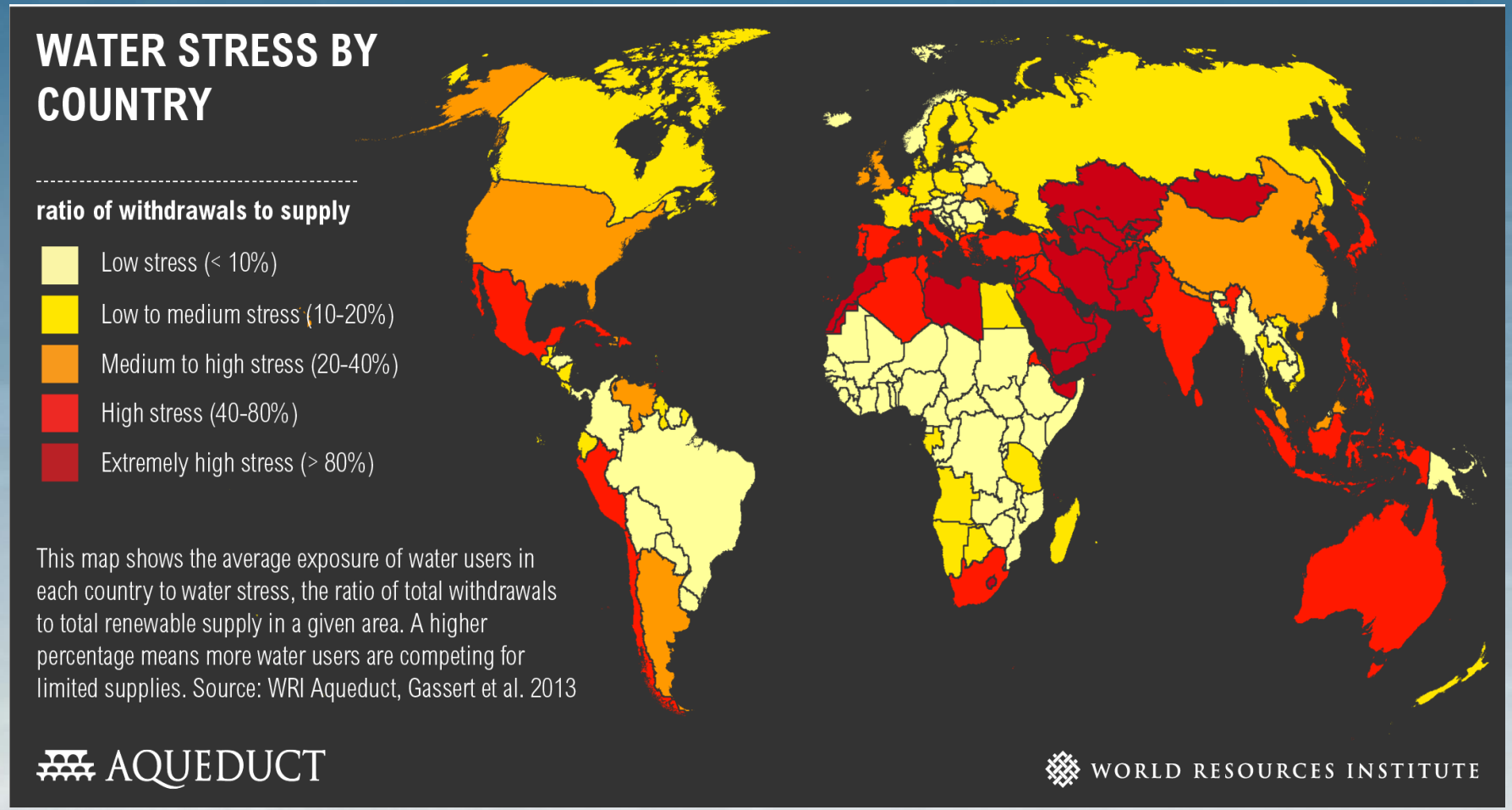
Background



The five main problems persisting to be faced by almost all countries in the world due to the impact of climate change in the next few decades include droughts and floods, water pollution, biodiversity loss, clean water and sanitation lack, and potential water conflicts.

Water Stress By Country in 2040



This map shows the average exposure of water users in each country to water stress and the ratio of total withdrawals to total renewable supply in a given area.

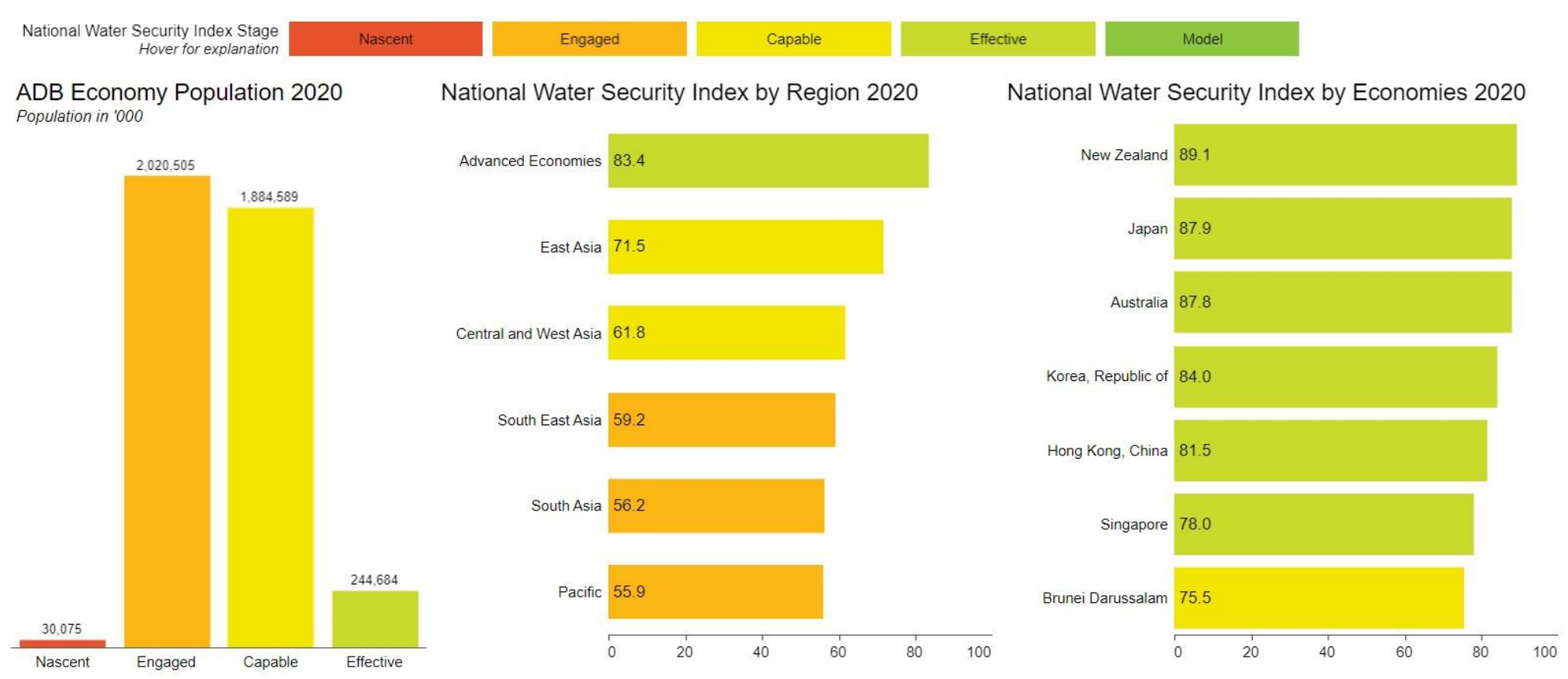
A higher percentage means more water users are competing for limited supplies.

Indonesia is categorized as high high-stress (40 – 80 %)

Water for prosperity and peace

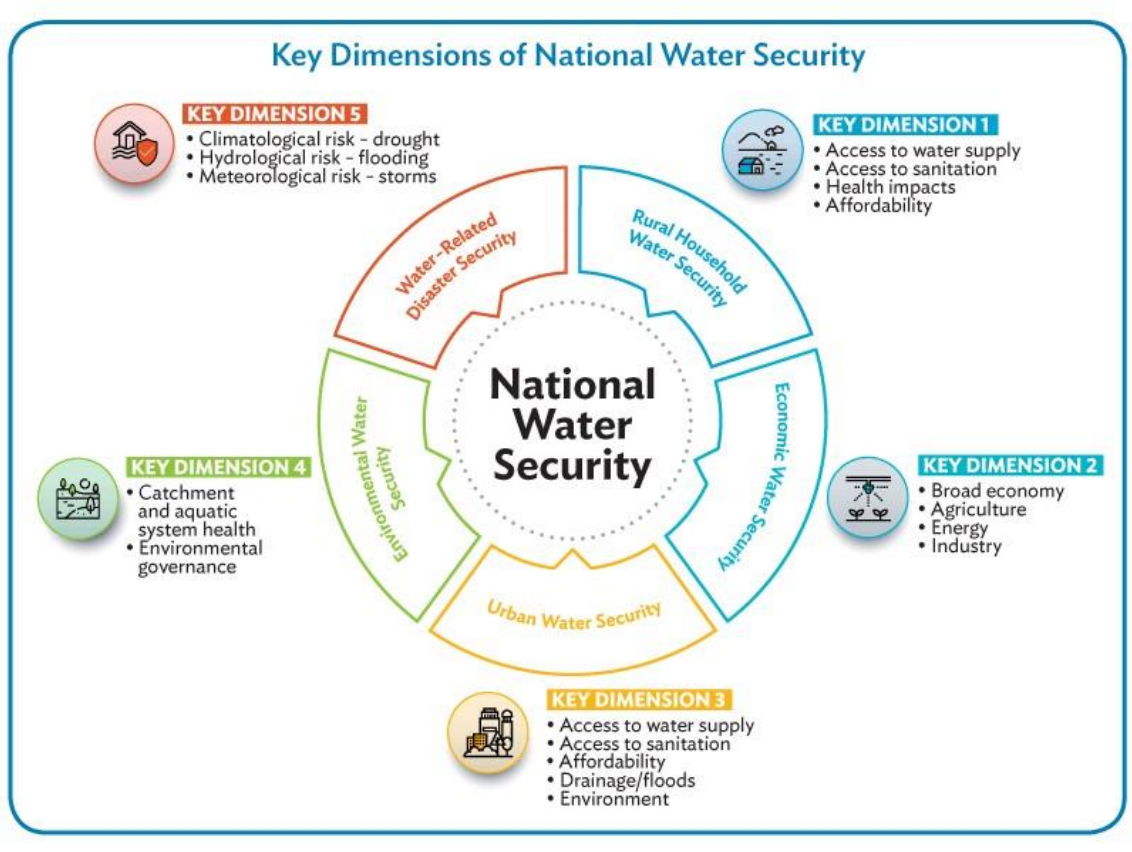
National Water Security Index

Indonesia, as part of South East Asia Countries, has an NWSI of 59.2 on average with an engaged status level.



Water for prosperity and peace

5 Key Dimensions of National Water Security



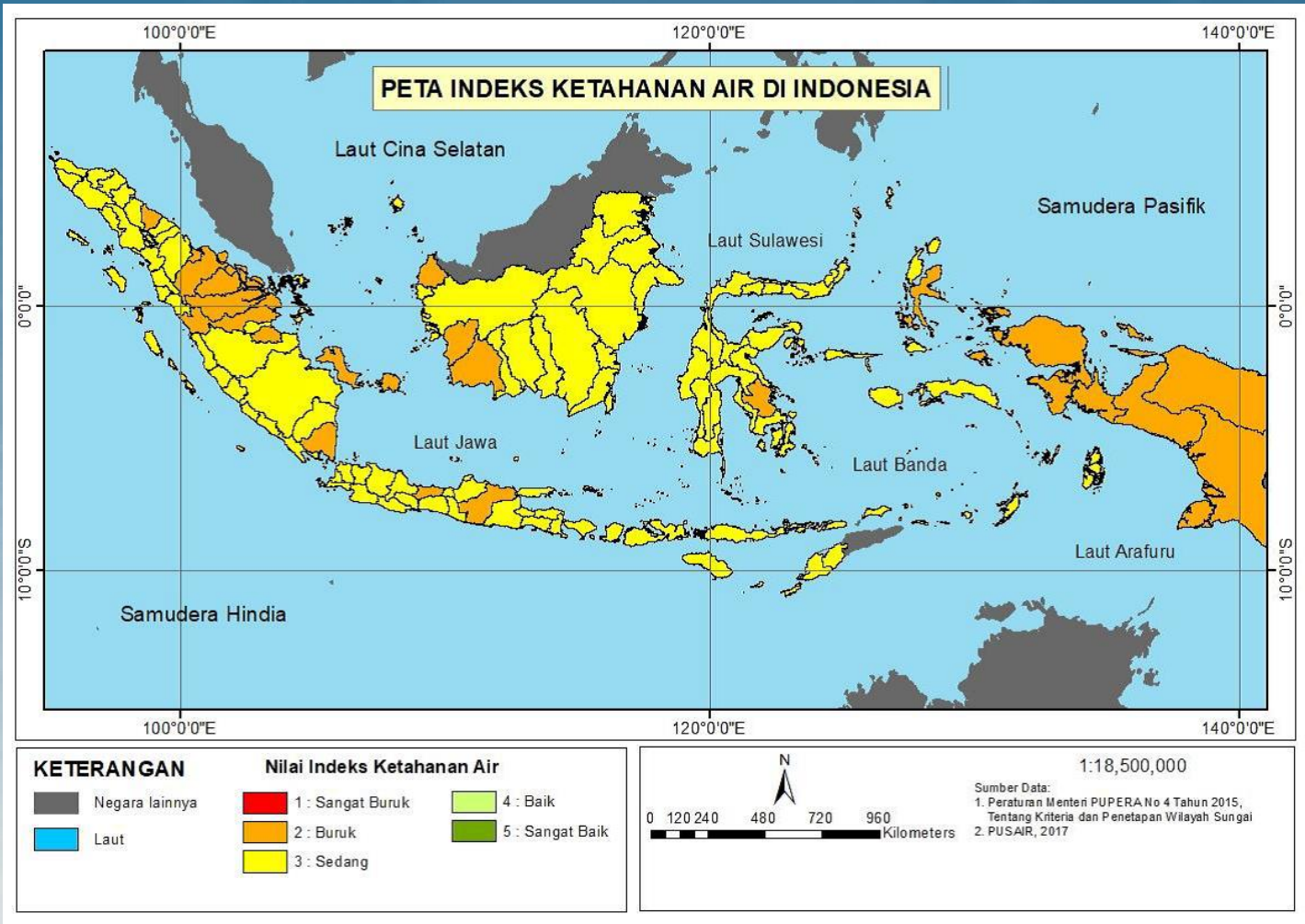
The vision for water security is built on five concepts: societies can enjoy water security when they successfully manage their water resources and services to:

(i) Satisfy rural household water and sanitation needs in all communities;
(ii) Support productive economies in agriculture, industry, and energy;
(iii) Develop vibrant, livable cities and towns;
(iv) Restore healthy rivers and ecosystems; and
(v) Build resilient communities that can cope with water-related extreme events.

[Source: AWDO, 2023]

Indonesia Water Security Index

Most regions in Indonesia have moderate to poor water security index levels

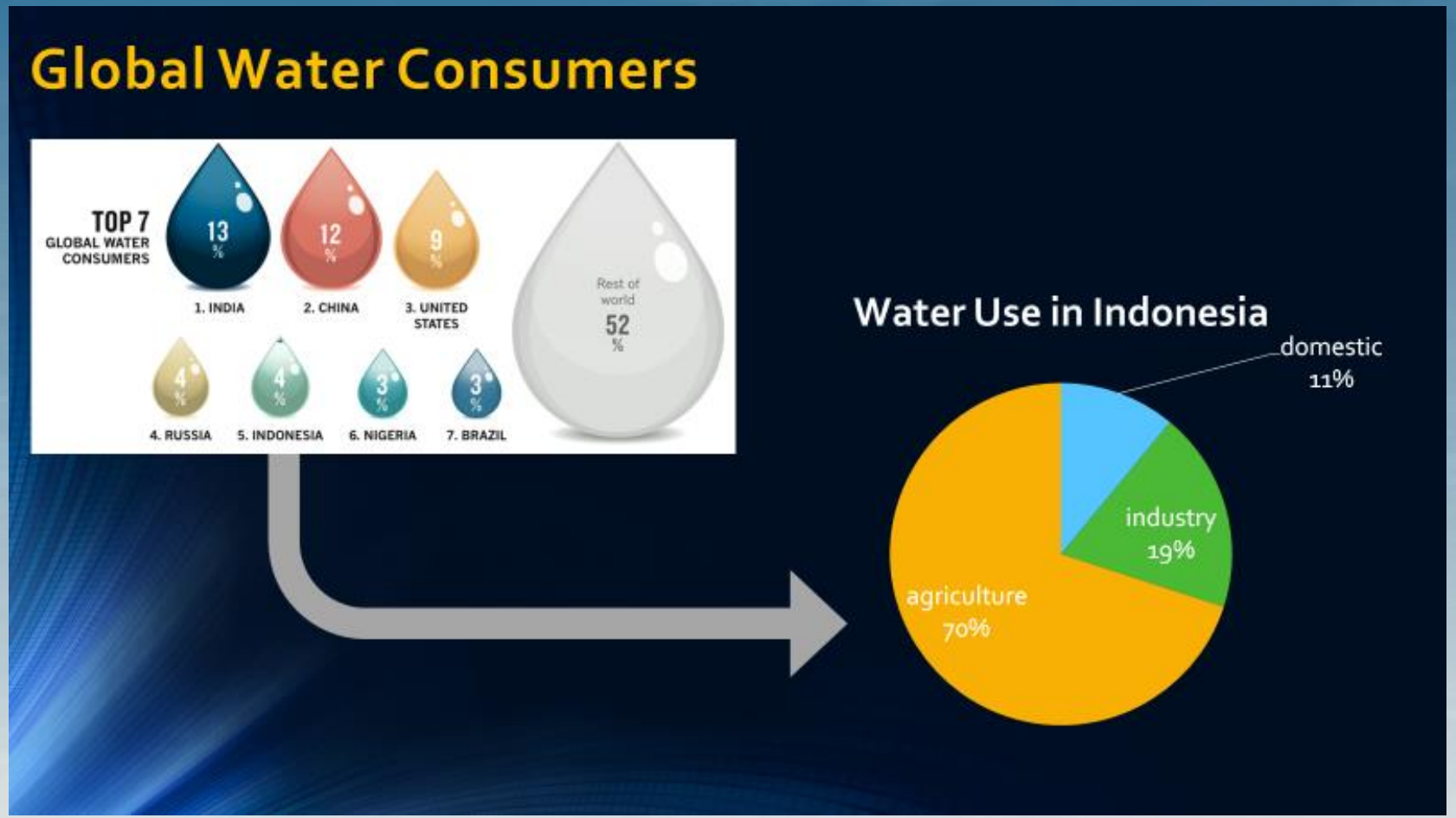


Water for prosperity and peace

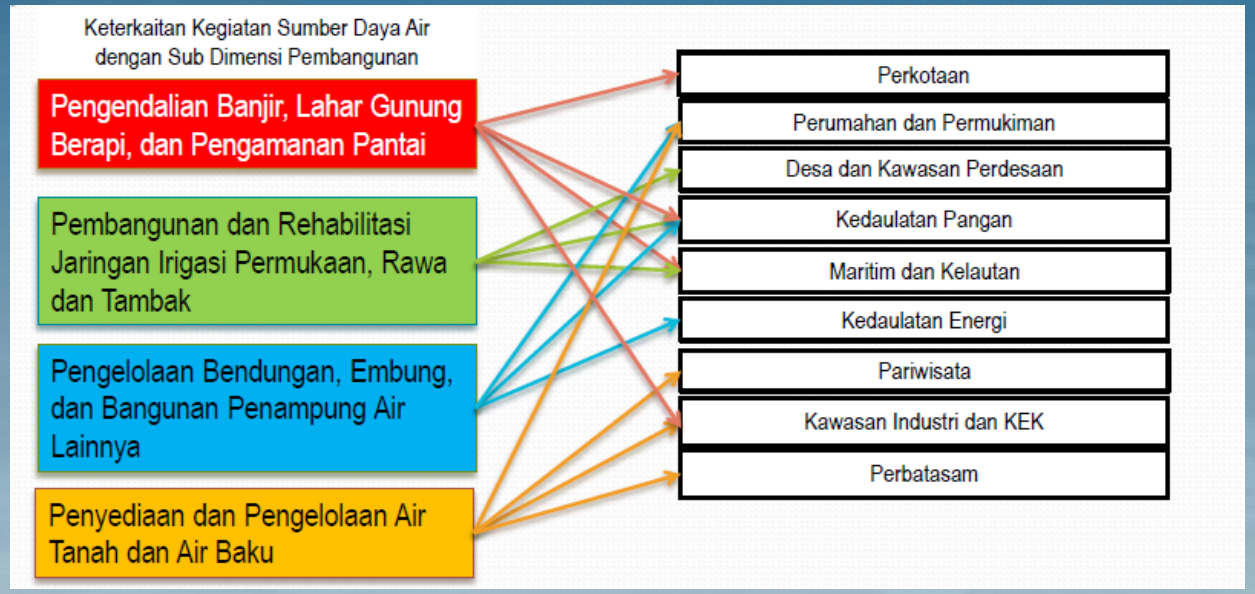
Source: https://teknologi.pu.go.id/indeks-ketahanan-air-pada-wilayah-sungai 2019

Consumers of Water

- Indonesia is the 5th global water consumer.
- The type of water used mainly consists of agriculture (70 %), industry (19 %), and domestic (11 %)



Contribution of Water Resources to the National Development Dimension



Inland waters of 13.85 million ha:

- 12 million ha of rivers and swamps
- Lake and situ 1.8 million ha
- Dam of 0.05 million ha

Contribution to the economy

- Fisheries Rp317.09 trillion rupiah
- Energy (76,000MW x USD 1.5 million)
- Agriculture 13.59% (IDR 10 T / year, irrigation)
- Clean water (Rp. 4T / year)
- Tourism (IDR 5T / year)

Linkage of water resources activities with sub-dimensions of national development:

- **Flood control, volcanic lava, and coastal protection**
- **Construction and rehabilitation of surface irrigation networks, swamps, and ponds**
- **Management of dams, reservoirs, and other water storage structures**
- **Supply and management of groundwater and raw water**

Water for prosperity and peace

COVID-19 Pandemic Impacts

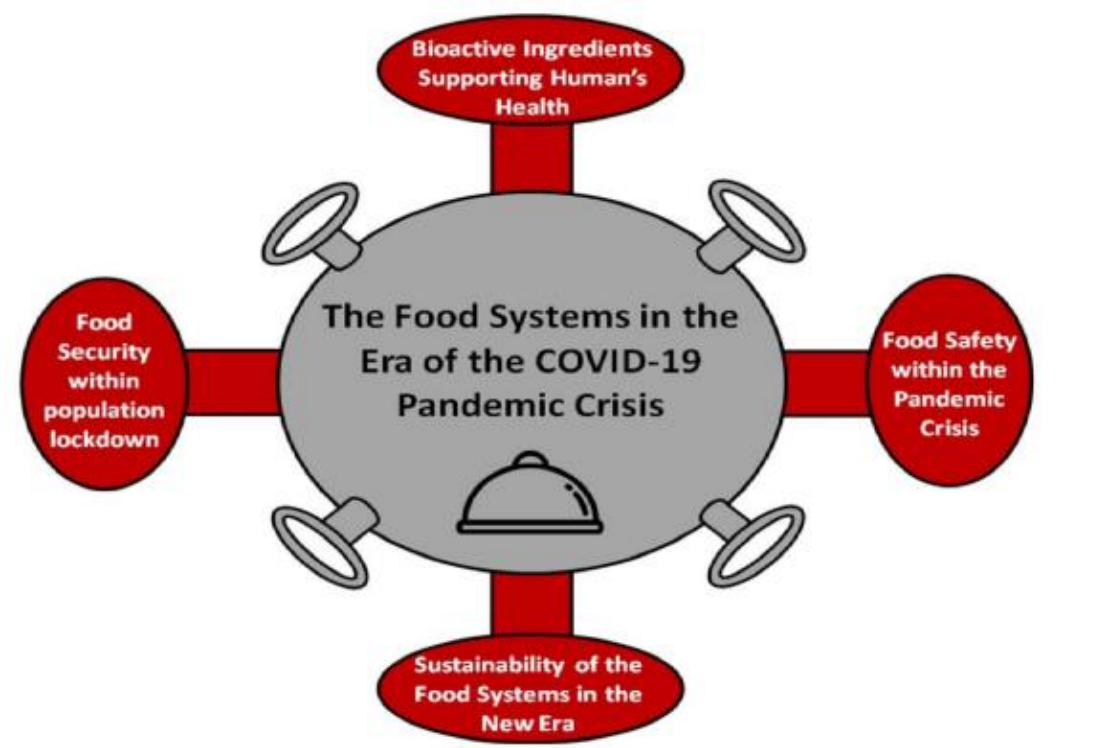


Figure 1. The food systems in the era of the coronavirus disease (COVID-19) pandemic crisis.

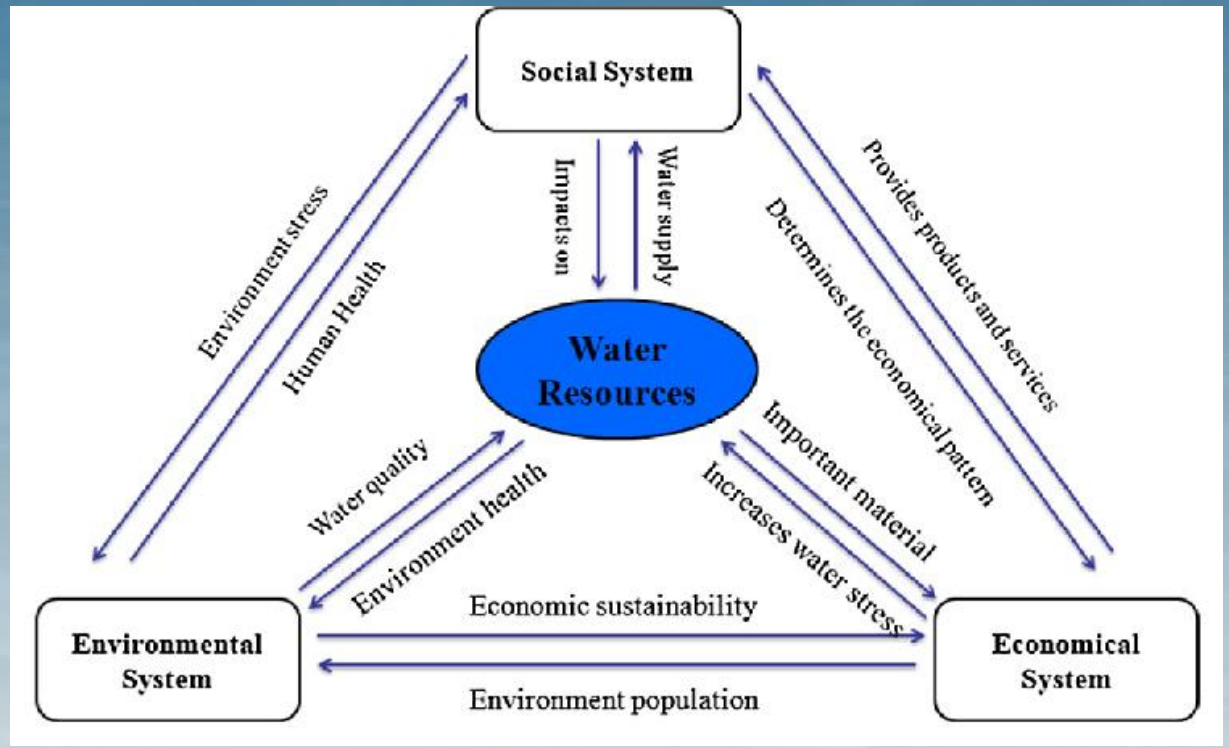
The Food Systems in the Era of the Coronavirus (COVID-19) Pandemic Crisis . Charis M. Galanakis, Foods 2020, 9, 523.
doi:10.3390/foods9040523

The COVID-19 Pandemic tends to change several human life aspects that should be considered:

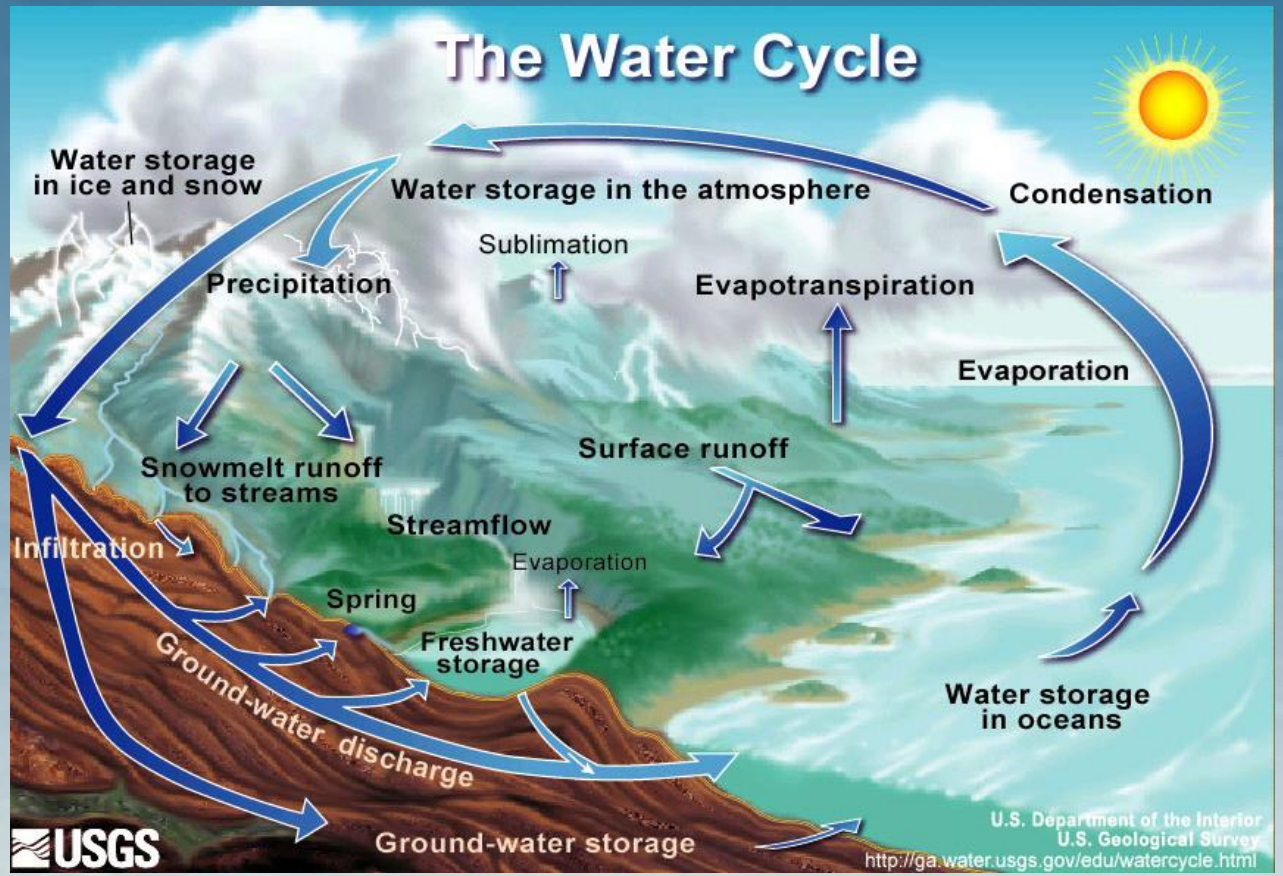
- **People Behavior**
- **Consumption adjustment**
- **Priority order**
- **Resources sharing**

National Concern on Water Availability

The Indonesian government issued UU No.17/2019, In dealing with an imbalance between the availability of water which tends to decrease, and the increasing need for water, water resources need to be managed by paying attention to social, environmental, and economic functions in harmony to create synergy and integration between regions, sectors and generations to meet the people's needs for water.



Water Origin



https://courses.lumenlearning.com/geophysical/chapter/distribution-of-earths-water/

We must realize that the water we use comes from the rotating water cycle. Human activities may alter the process and water availability over the decade.

Projected Rainfall Changes in Indonesia

Projected rainfall of the 2010 to 2020 period shows more significant increases in the rainfall of the December-January-February-March period 6 over large regions.

Region	Mean Rainfall												Standard Deviation											
	Month (January to December)												Month (January to December)											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Java-Bali	▼	▲	▲	▲	○	▲	○	○	▼	○	▼	▲	✸	✪	✪	◎	◎	◎	◎	◎	◎	✪	◎	◎
Sumatra	▲	▲	▲	▲	+	○	▲	▲	▲	▲	+	▲	✸	✸	✪	✪	◎	◎	◎	✪	◎	✪	✪	✪
Sulawesi	▲	▲	▲	▲	+	▲	○	▼	+	▼	+	▲	✸	✪	✪	◎	✪	◎	◎	✪	✪	✪	◎	◎
Kalimantan	▲	▲	▲	▲	+	○	▼	▼	▲	▼	+	▲	✪	✪	✪	✪	◎	◎	◎	✪	◎	✪	◎	◎
Maluku	○	▲	▲	○	○	▲	▼	▼	○	▼	+	▲	✪	✪	✪	✪	◎	✪	◎	◎	◎	◎	◎	◎
Nusa Tenggara	▼	▼	▲	○	○	○	○	○	▲	▼	○	▲	✪	✪	✪	◎	◎	◎	◎	◎	◎	◎	✸	◎
Papua	▲	▼	▲	▲	+	▲	+	▲	▲	○	▲	▲	✪	✪	✪	✪	◎	◎	✪	✪	◎	◎	◎	◎

▲ : mainly increasing , ▼ : mainly decreasing, + : ▲ and ▼ are almost evenly distributed,
○ : mainly unchanged , ✸ : mainly increasing (standard deviation), ✪ : most area increasing,
✪ : most area decreasing, ◎ : unchanged or changes are not significant

[Source: ICCSR_Bappenas]

Trend of Rainfall Change in Indonesia

Region	Sub-Region	Month (January – December)											
		J	F	M	A	M	J	J	A	S	O	N	D
Jawa-Bali	West	↗	↗								↘		↗
	Central	↗	↑		↘								↗
	East	↗	↑		↘								↗
	Bali Island		↑		↘				↑				↗
Sumatra	North	↘	↘	↘	↘	↗	↗	↗	↑	↑	↗	↗	
	Central-North					↗	↗	↗	↑	↗	↗	↗	↗
	Central-South	↗	↗	↗	↗			↗	↗	↗		↗	↗
	South	↗	↗	↗	↗						↘		↗
Sulawesi	North				↗	↑	↗		↑	↗	↗		
	Central				↑	↗	↗	↘			↗	↗	↗
	South	↑	↗	↗	↗	↗			↘				↗
	South East	↗			↗	↗			↘				
Kalimantan	North West	↘		↘		↗	↗	↗	↑	↗		↗	
	South West	↑	↑	↗	↗	↗	↗	↗	↗	↗			↗
	North East					↗	↗		↗	↗			↗
	South East	↗	↗			↗				↗			↗
Maluku	North	↗			↑	↑	↑	↑	↑	↑	↑	↑	↑
	Central				↗	↗	↑		↗	↑	↑		
	West				↑	↗		↘					
	South				↗	↑	↗			↑	↑	↗	
Nusa Tenggara	West		↗		↘						↗		
	Central		↗										
	East				↘	↘					↗		
	Timor Island					↘					↗		
Papua	West	↑	↗	↗	↗	↑	↑	↗	↑	↑	↑	↗	↗
	Central	↑	↗	↗	↗	↗	↗	↗		↑	↑	↗	↑
	East	↑	↗	↗	↗	↗	↗	↗		↑	↑	↗	↑
	South	↗							↘				

↑ Highly significant increase (≥50 mm), ↗ significant increase (≥25 mm; <50 mm),
↘ significant decrease, ↓ highly significant decrease

Results from GCM output do not show a **significant change in the rainfall pattern** from 2020 to 2050. However, large changes can be found in the projected rainfall of the 2070-2100 period, especially for higher CO_2 emission scenarios (SRES A2).

[Source: ICCSR]

Projection of El Niño and La Niña

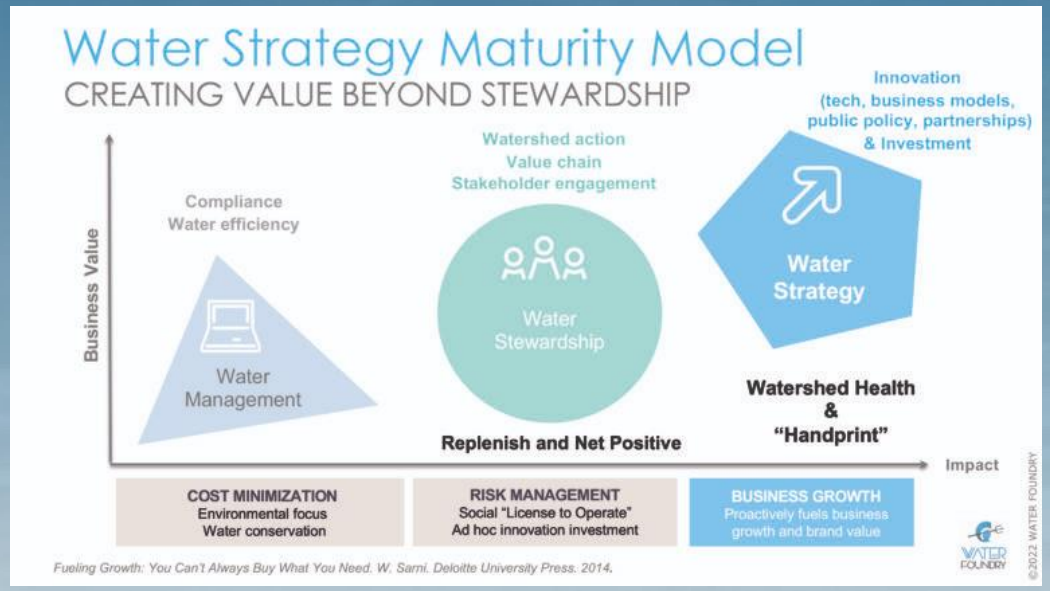
The projected frequency of ENSO events, **El Niño and La Niña, is expected to increase** from its current 3 to 7 years interval to happening every 2 to 3 years.

	Jan	Feb	Mar	Apr	Mei	Jun	Jul	Agus	Sep	Okt	Nop	Des
2001	-1.04	-0.86	-0.81	-0.33	-0.55	-0.29	0.12	0.26	-0.34	-0.85	-0.85	-1.02
2002	-1.04	-0.77	-0.47	0.13	0.77	0.75	1.00	1.37	1.47	1.77	1.79	1.60
2003	1.13	0.81	0.09	-0.35	-0.56	-0.61	-1.16	-1.16	-1.05	-0.67	-0.69	-0.95
2004	-0.83	-1.20	-1.19	-0.86	-0.37	-0.78	0.30	0.42	0.77	0.93	0.89	1.13
2005	0.84	0.29	0.00	-0.25	-0.38	-0.75	-0.45	-0.68	-0.32	-0.77	-1.07	-0.99
2006	-0.89	-1.12	-1.19	-1.79	-1.68	-1.04	-0.53	-0.41	-0.36	-0.30	-0.28	-0.55
2007	-0.63	-0.93	-0.80	-0.72	-0.91	-0.29	0.10	0.23	0.43	0.72	0.76	0.69
2008	0.78	0.53	0.23	0.06	-0.90	-0.76	-0.84	-0.36	-0.67	-0.82	-0.75	-1.01
2009	-1.07	-0.78	-0.11	0.07	0.29	1.21	1.39	1.58	1.36	1.29	1.38	1.31
2010	0.98	0.56	-0.26	-1.18	-1.48	-1.23	-1.44	-1.74	-1.56	-1.86	-1.93	-2.11
2011	-1.98	-1.91	-1.63	-1.28	-0.10	1.53	2.21	1.99	2.24	2.40	2.73	3.06
2012	2.75	2.37	1.61	1.00	0.83	-0.06	-0.20	-0.01	-0.78	-1.02	-1.18	-1.59
2013	-1.45	-1.22	-0.54	-0.50	-0.42	-0.11	0.04	0.50	0.38	0.07	-0.08	0.12
2014	0.03	-0.20	-0.27	0.31	0.04	-0.24	-0.35	-0.46	-0.44	-0.14	-0.59	-0.54
2015	-0.70	-0.91	-0.50	-0.13	-0.04	-0.44	-0.15	-0.39	-0.05	-0.26	-0.52	-0.55
2016	-1.09	-0.91	-0.36	0.02	0.11	0.12	0.67	-0.03	-0.43	-0.45	-0.84	-0.97
2017	-1.09	-1.18	-1.30	-0.68	-0.95	-1.33	-1.09	-1.67	-1.91	-2.00	-2.09	-2.20
2018	-1.93	-1.97	-1.80	-1.36	-0.52	1.09	2.24	1.65	1.74	1.94	2.23	2.36
2019	2.50	2.25	1.85	1.39	1.19	0.73	0.50	0.73	0.45	0.17	-0.42	-0.78
2020	-0.82	-1.03	-0.85	-0.74	-1.26	-1.13	-1.41	-1.71	-2.28	-2.16	-2.35	-1.87
2021	-1.51	-1.54	-1.50	-1.09	-0.15	0.14	0.06	0.24	-0.21	-0.27	-0.08	-0.02
2022	-0.06	-0.18	-0.53	-0.56	-0.50	-0.83	-0.48	-0.40	-0.60	-0.71	-0.95	-1.49
2023	-1.40	-1.32	-0.90	-0.46	-0.03	1.05	0.63	1.13	1.04	0.92	0.73	0.25
2024	0.47	0.36	-0.28	-0.94	-1.33	-1.25	-1.31	-0.95	-0.85	-1.03	-0.90	-0.88
2025	-0.86	-0.97	-0.47	-0.66	-0.65	-0.48	-0.53	-0.36	0.29	0.53	0.70	0.50
2026	0.73	0.71	0.42	0.23	-0.56	-0.83	-0.85	-1.23	-1.87	-1.59	-1.64	-1.43
2027	-1.38	-2.00	-1.94	-1.49	-0.48	0.11	0.12	0.40	0.44	0.38	0.06	-0.38
2028	-0.54	-0.26	0.03	-0.20	-0.81	-0.64	-0.27	-0.44	-0.04	0.28	0.02	0.08
2029	0.26	0.39	0.18	-0.34	-0.65	-0.88	-1.37	-1.47	-1.94	-2.25	-1.92	-1.24
2030	-0.92	-0.80	-1.14	-0.89	-0.77	-0.79	-0.19	-0.12	0.51	0.45	0.56	0.37

La Niña El Niño

Source: ICCSR

Strategic Issues for the Water Sector in the New Era



[Source: International Water Association 2022]

- Maintaining the balance between water availability and demand
- Sufficient water infrastructure and the provision of alternative water sources in certain areas.
- Availability of data, technology, and research as a basis for water resource management.
- Reduction of vulnerability and risk from water shortage, flood, and drought.
- Finding synergetic solutions for cross-sector issues with agriculture, forestry, health, energy, and industry sectors.
- Integrated water resources management and flood control.
- Water conservation based on innovation, community participation, and local wisdom.

Water for prosperity and peace

Real Action

It is time to take action to save our planet

ECOHYDROLOGY

Ecohydrology (EH) is a transdisciplinary science studying the interactions between water and ecosystems including the ecological processes that occur in the hydrological cycle and seeks to utilize these processes to improve environmental sustainability. [Zalewski, 2014]

1. Hydrology

Understanding the hydrological cycle, interactions of water, biota, and environment at the watershed scale to identify threats and opportunities.

2. Ecology

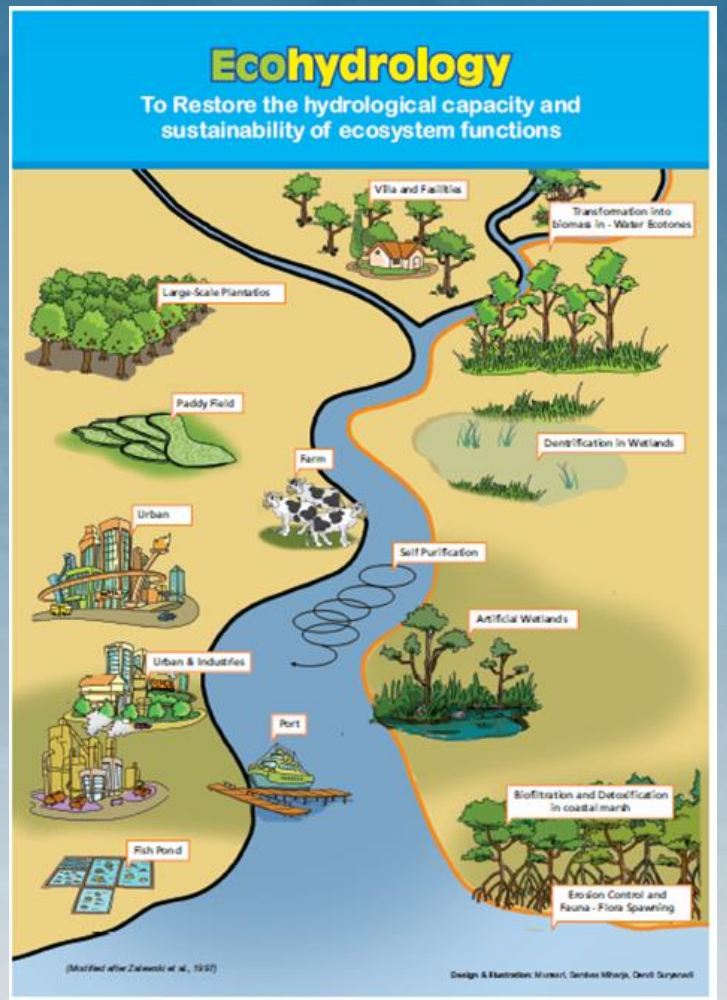
Understanding ecosystem resilience to stress and patterns of ecological succession to increase its carrying capacity.

3. Ecotechnology

Utilization of ecosystem characteristics combined with appropriate technology for environmental conditions and restoration of biodiversity, improvement of water quality, and ecosystem services.

4. Culture

Understanding social, economic, and cultural aspects of society and stakeholders to increase participation in accelerating problem resolution.



Water for prosperity and peace

Water Education:
Ecohydrology for All

Water for prosperity and peace

Closing Remarks

- Even though the Indonesian government is fully concerned about climate change issues and problems and their impacts on water resources, policy adjustment should be strengthened to achieve the SDGs target in the future.
- Understanding the water cycle and climate change will help using and managing water sustainably.
- Ecohydrology is a comprehensive approach to enhance sustainable management of water resources.
- The COVID-19 Pandemic tends to change people's behavior, consumption adjustment, and priority orders that should be considered in the future.

THANK YOU...!

UNESCO- Water Family Webinar
World Water Day

Water for Prosperity and Peace

Water for prosperity and peace