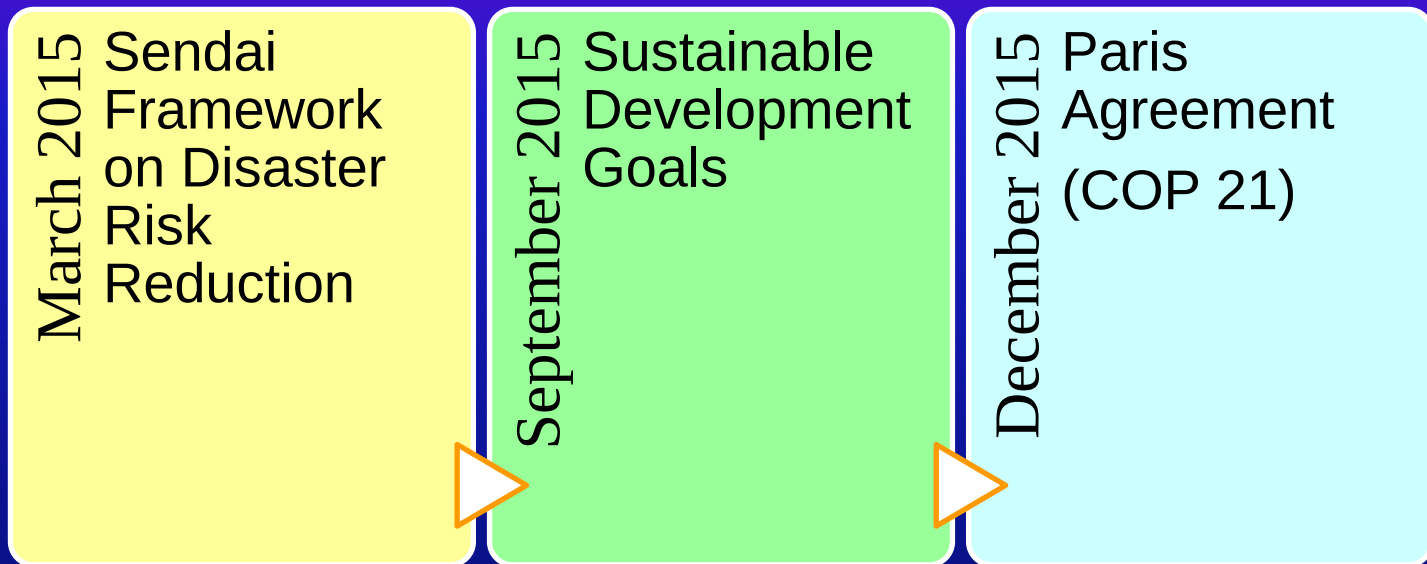


GEO-Water under Three Key Global Agendas in 2015



- The world knows that countries cannot act in isolation to address these issues.
- Concerted Action is Required

GEO-Water under Three Key Global Agendas in 2015

March 2015

Sendai
Framework
on Disaster
Risk
Reduction

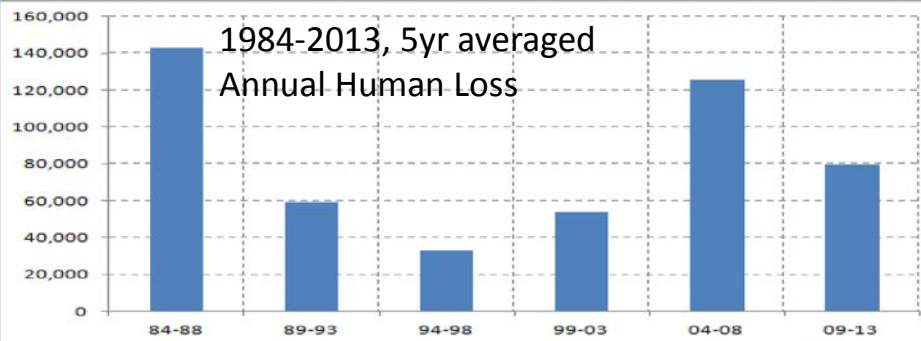
September 2015

Sustainable
Development
Goals

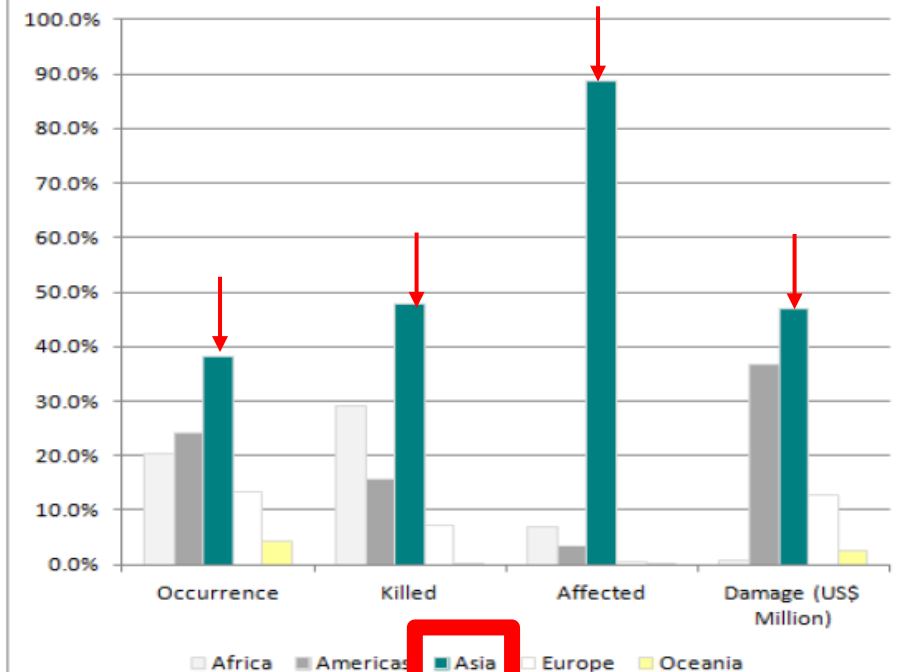
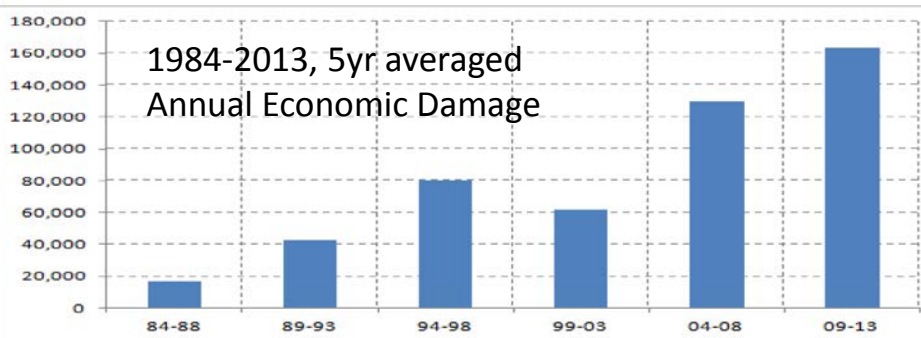
December 2015

Paris
Agreement
(COP 21)

1984-2013, 5yr averaged
Annual Human Loss

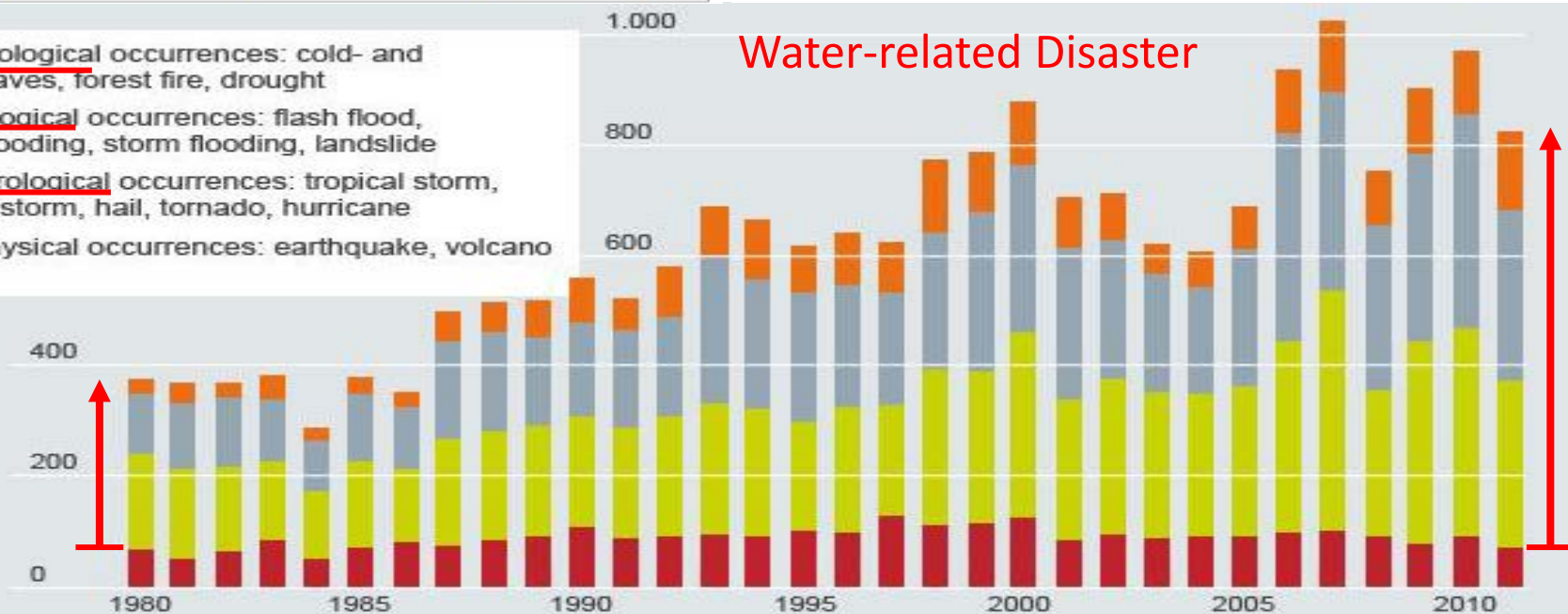


1984-2013, 5yr averaged
Annual Economic Damage



- Climatological occurrences: cold- and heatwaves, forest fire, drought
- Hydrological occurrences: flash flood, river flooding, storm flooding, landslide
- Meteorological occurrences: tropical storm, winter storm, hail, tornado, hurricane
- Geophysical occurrences: earthquake, volcano

Water-related Disaster



GEO-Water under Three Key Global Agendas in 2015

March 2015
Sendai
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Paris
Agreement
(COP 21)

SUSTAINABLE DEVELOPMENT GOALS



17 Sustainable Development Goals and 169 targets

GEO-Water under Three Key Global Agendas in 2015

March 2015

Sendai
Framework
on Disaster
Risk
Reduction

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Sustainable
Development
Goals

December 2015

Paris
Agreement
(COP 21)

Change in water-related extremes

AR4(2007), SREX(2010), AR5(2013)

Phenomenon and direction of trend	Assessment that changes occurred (typically since 1950 unless otherwise indicated)	Likelihood of further changes
		Late 21st century
<u>Heavy precipitation events.</u> <u>Increase in the frequency, intensity, and/or amount of heavy precipitation.</u>	<i>Likely</i> more land areas with increases than decreases (c) {2.6}	<i>Very likely</i> over most of the mid-latitude land masses and over wet tropical regions {12.4}
	<i>Likely</i> more land areas with increases than decreases <i>Likely over most land areas</i>	<i>Likely</i> over many areas <i>Very likely over most land areas</i>
<u>Increases in intensity and/or duration of drought</u>	<i>Low confidence</i> on a global scale <i>Likely</i> changes in some regions (d) {2.6}	<i>Likely (medium confidence)</i> on a regional to global scale (h) {12.4}
	<i>Medium confidence</i> in some regions <i>Likely in many regions, since 1970 (e)</i>	<i>Medium confidence</i> in some regions <i>Likely (e)</i>
<u>Increases in intense tropical cyclone activity</u>	<i>Low confidence</i> in long term (centennial) changes <i>Virtually certain</i> in North Atlantic since 1970 {2.6}	<i>More likely than not</i> in the Western North Pacific and North Atlantic (j) {14.6}
	<i>Low confidence</i> <i>Likely (in some regions, since 1970)</i>	<i>More likely than not</i> in some basins <i>Likely</i>
<u>Increased incidence and/or magnitude of extreme high sea level</u>	<i>Likely</i> (since 1970) {3.7}	<i>Very likely</i> (l) {13.7}
	<i>Likely</i> (late 20th century) <i>Likely</i>	<i>Very likely</i> (m) <i>Likely</i>

GEO-Water under Three Key Global Agendas in 2015

Understanding Governance Investment Implementation



Concerted Action is Required



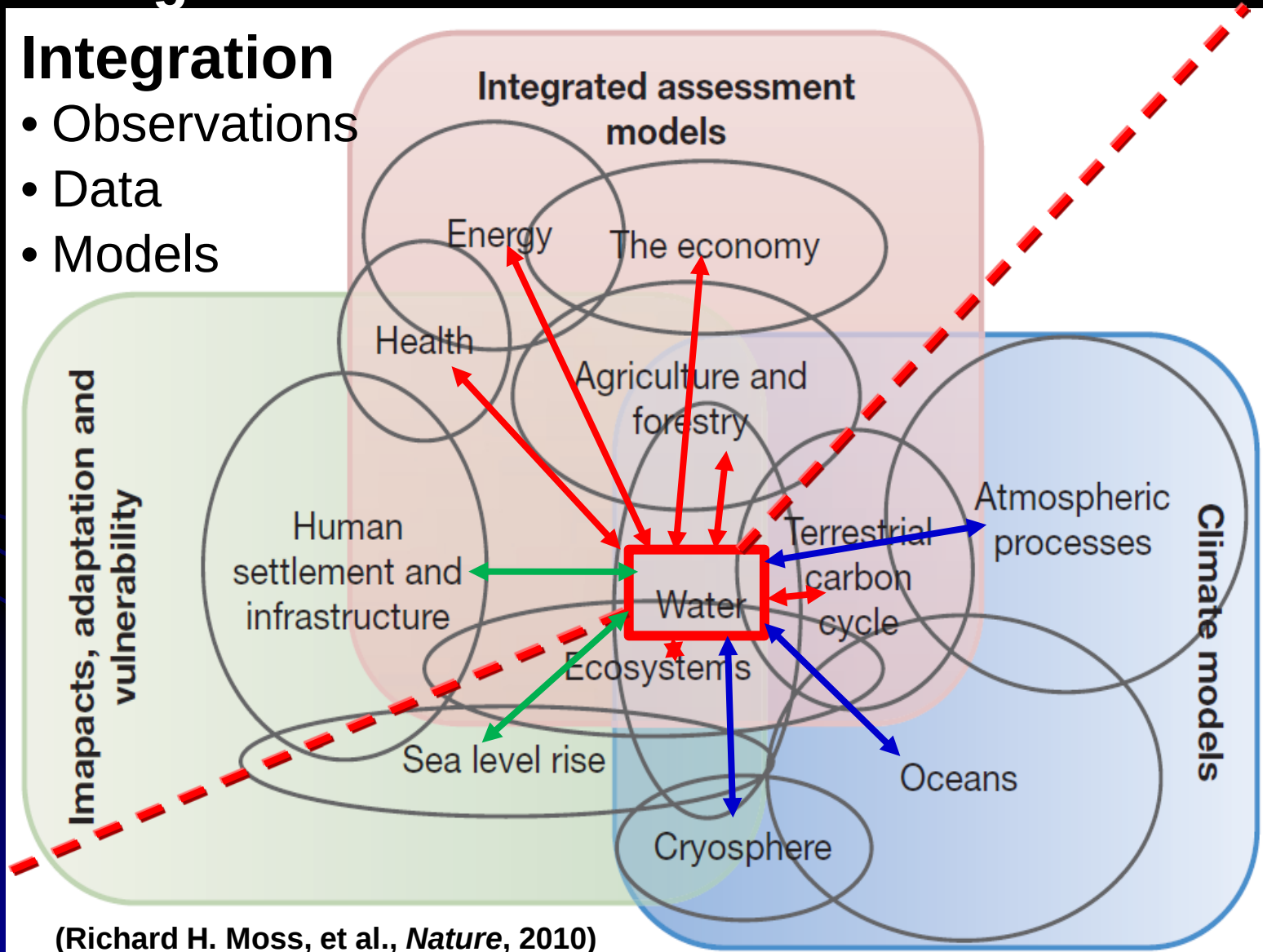
Holistic, Evident-based, Quality, Quantity

Water is Key

Dialogue → Platform

Integration

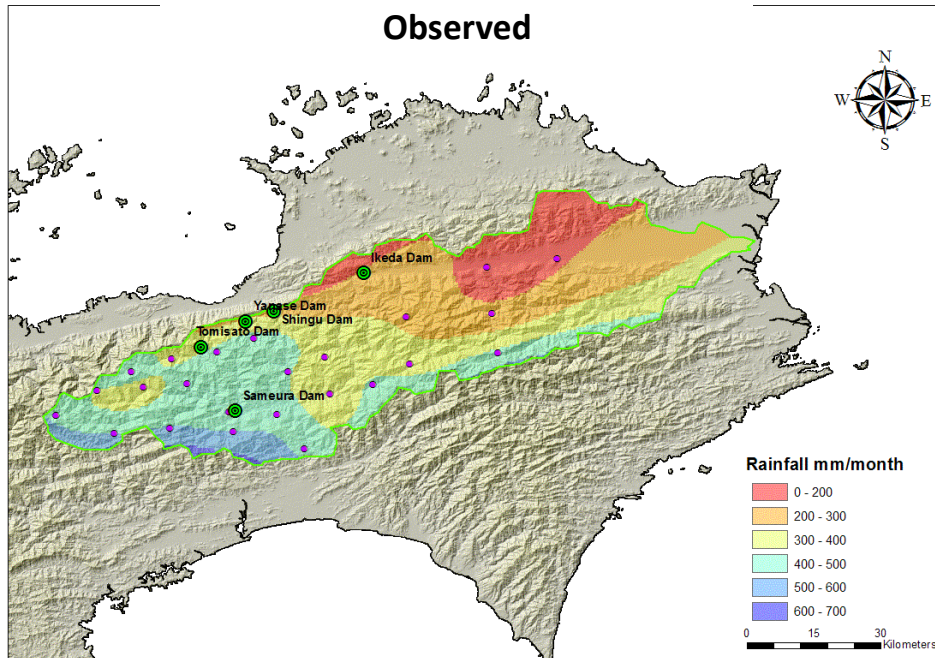
- Observations
- Data
- Models



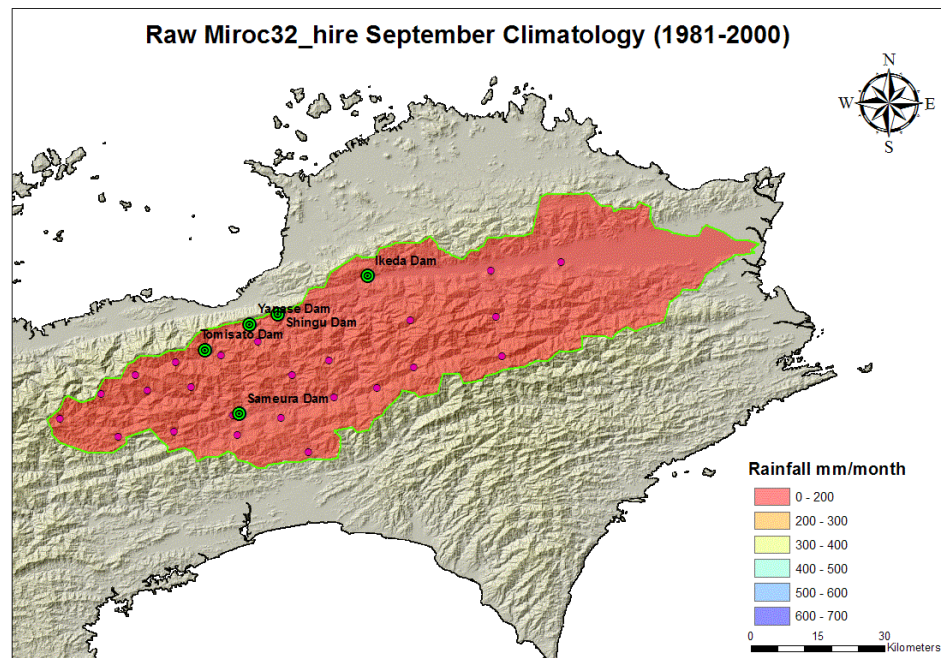
Bias-correction and Down-scaling in Yoshino River

(20 years average of monthly rainfall in September)

Observed



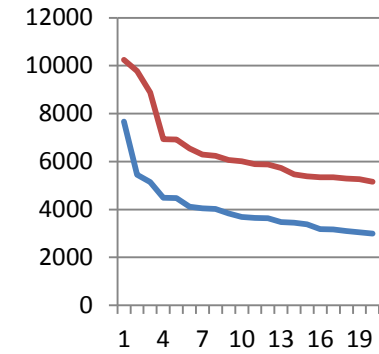
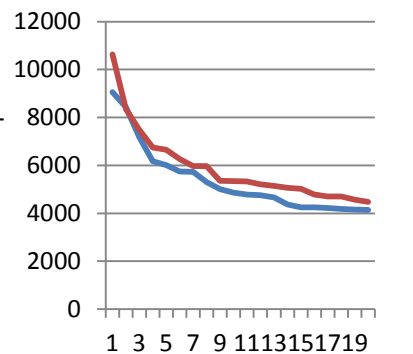
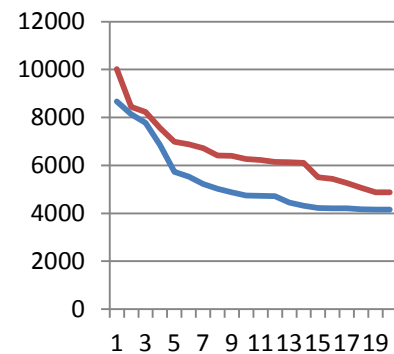
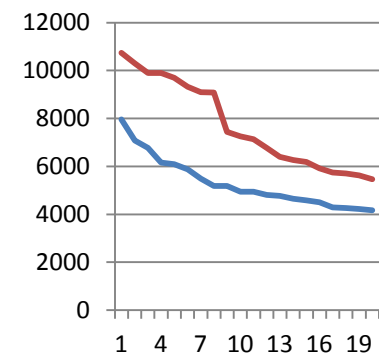
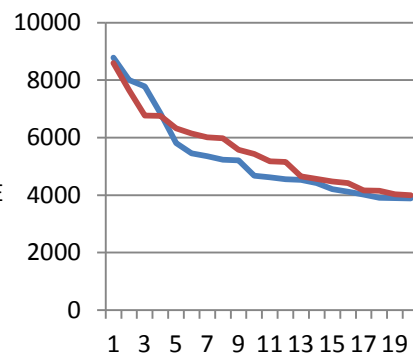
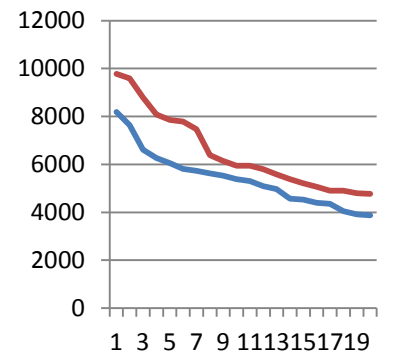
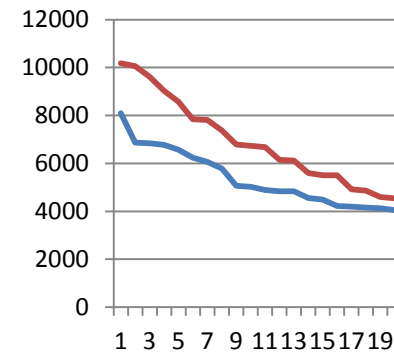
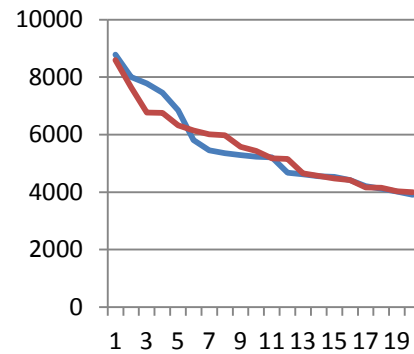
Raw Miroc32_hire September Climatology (1981-2000)



Top 20 Large Floods at the Ikeda, Yoshino River

past(1981-2000)—future(2046-2065) (m^3/s)

**Severer Floods
Very Likely**

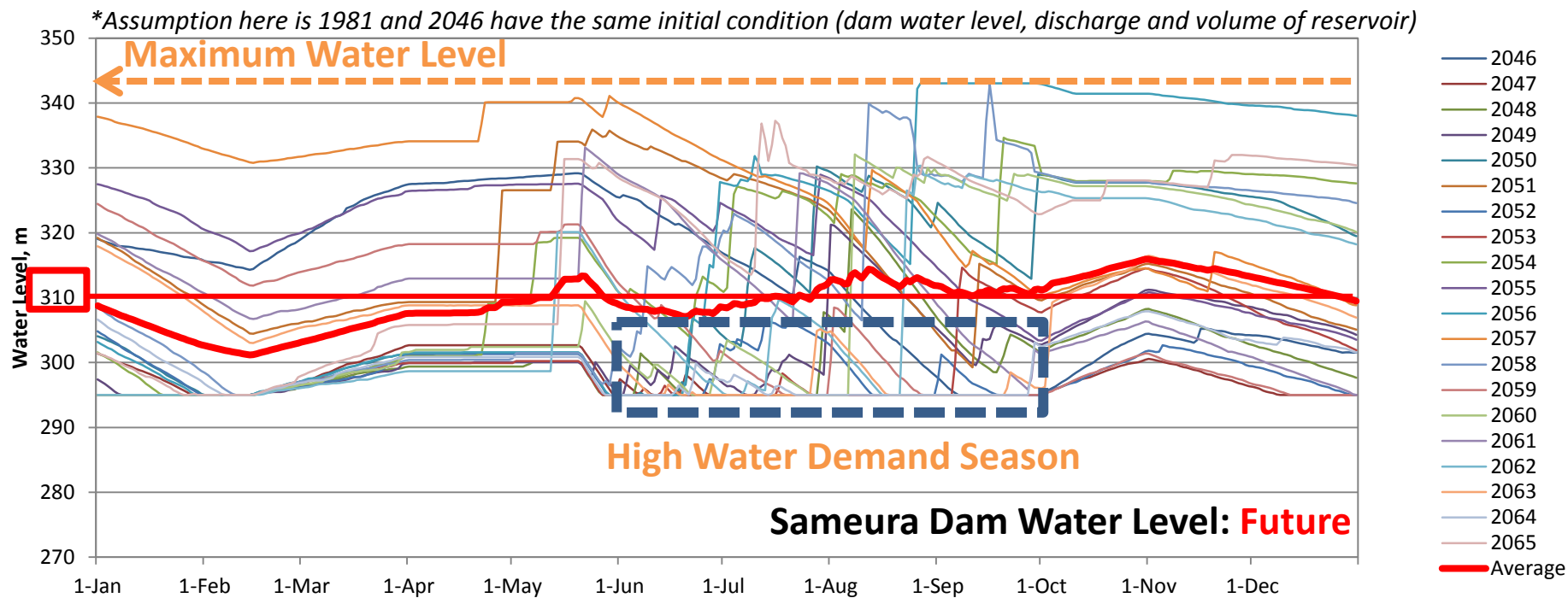
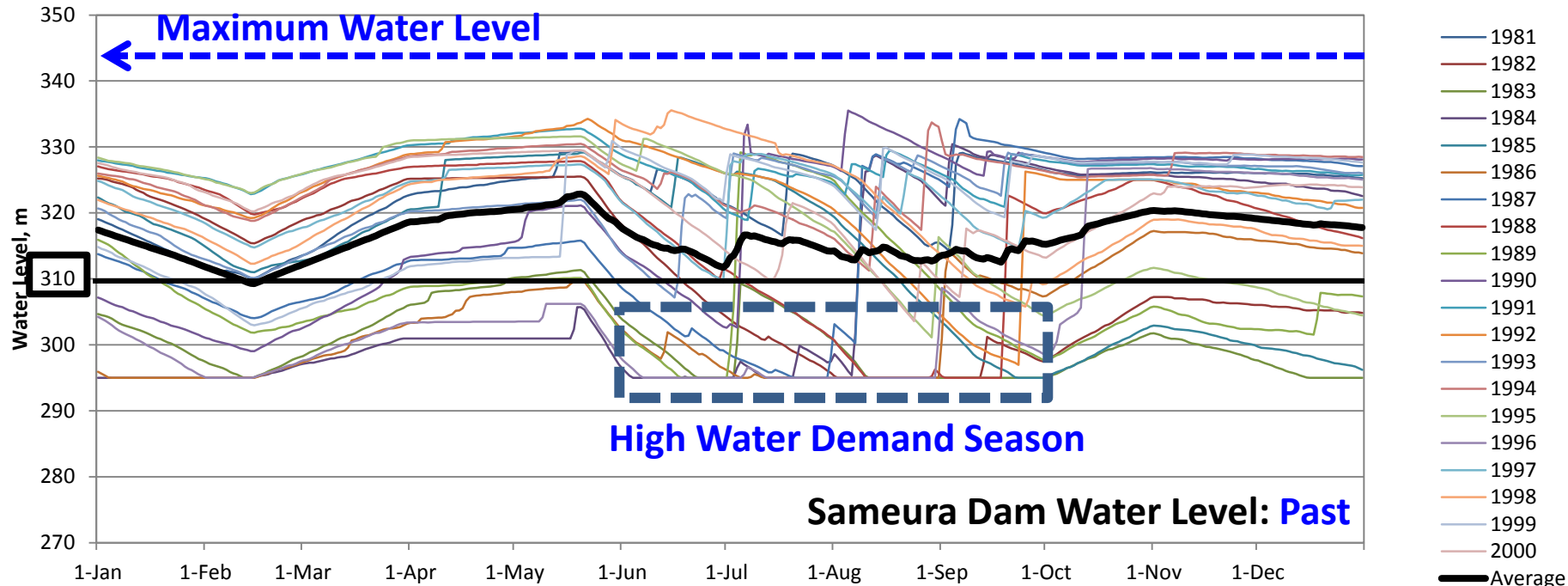


Changes in Drought at the Sameura Dam

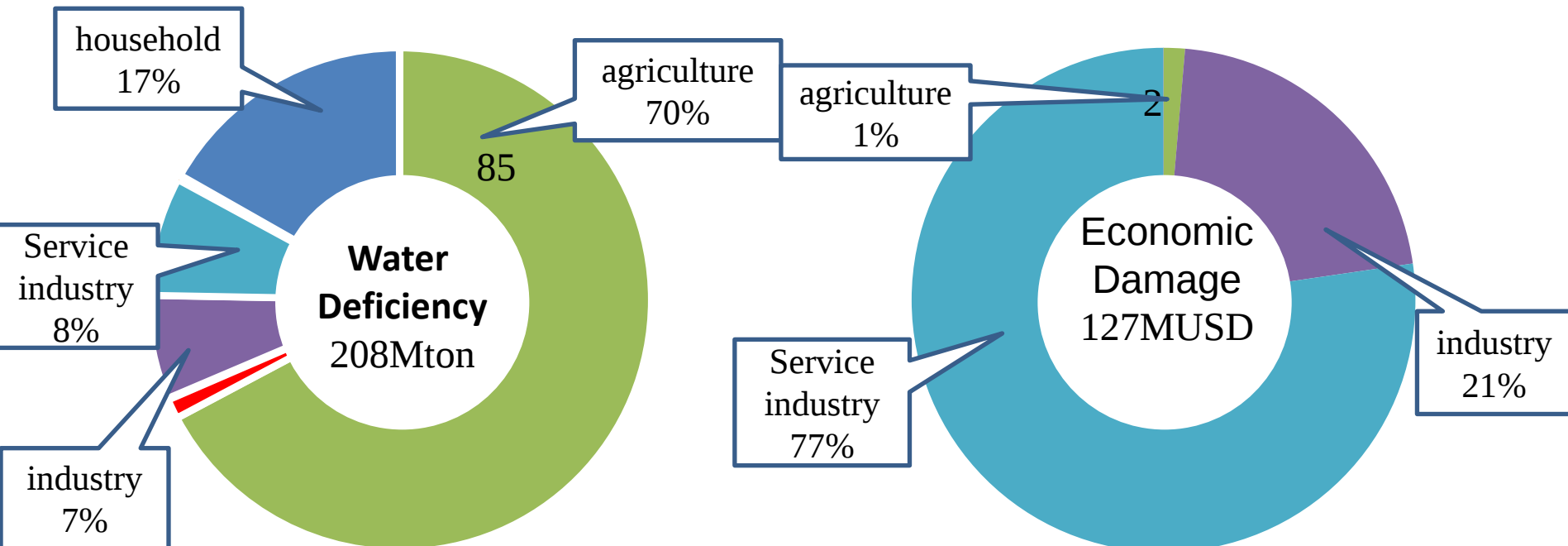
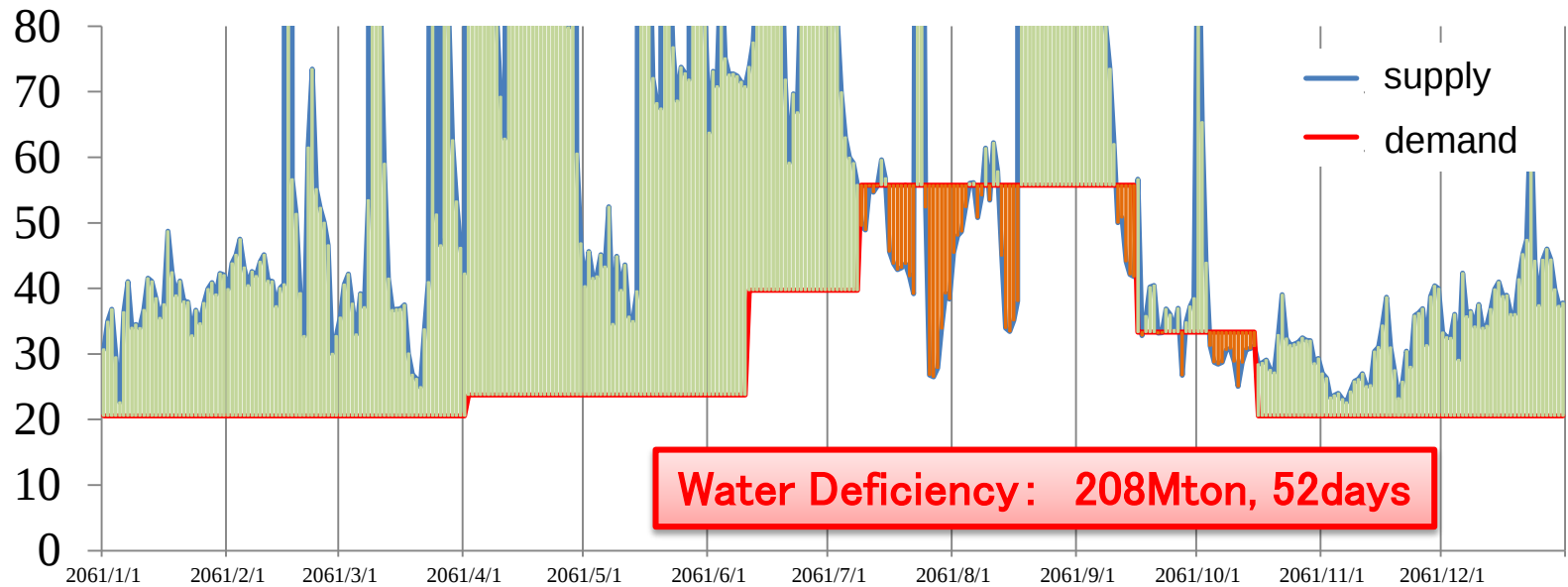
(blue: drought decrease red: drought increase)

Severe Drought: Likely

Selected Models	20 Years Averaged Drought Discharge			10 Years Probability Drought Discharge	
	past	future		past	future
CSIRO_0	2.96	3.00	↑	1.21	1.10
CSIRO_5	2.97	3.00	↑	1.21	1.10
INGV	3.23	3.13	↓	1.10	1.24
IAP	3.51	3.57	↑	1.22	1.26
MIROC_H	4.35	3.18	↓	1.28	1.22
MIROC_M	3.14	3.17	↑	1.22	1.21
GFDL	4.77	3.8102	↓	1.26	1.26
MRI	3.14	3.17	↑	1.28	1.23



Takamatsu City: Projected Most Severe Drought



- Water Deficiency: 2.1Mton
- Economic Damage: 127MUSD

Options of Climate Change Adaptation		Reduced Drought Volume (Mton)	Economic Option Effect (MUSD)	Cost (MUSD)	Reduced Economic Damage (MUSD)
Development of New Water Resources	Dam A	1.12	68.3	3.7	62.7
	Dam B	1.00	61.0	5.0	70.9
	desalinization	1.30	79.5	31.7	79.1
Effective Use	Recharge, Retention and Reuse (3R)	0.98	67.1	1.5	61.3
	Rain Water Harvesting (penetration: 30%)	0.32	19.7	-	(107.2)
	(penetration: 100%)	1.08	65.8	-	(61.1)
Water-Saving	Water-Saving Device (penetration: 30%)	0.32	19.2	-	(107.7)
	(penetration: 100%)	1.05	64.1	-	(62.8)
	Raising water-rate	0.22	13.3	-	(113.6)

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Concerted Action is Required

