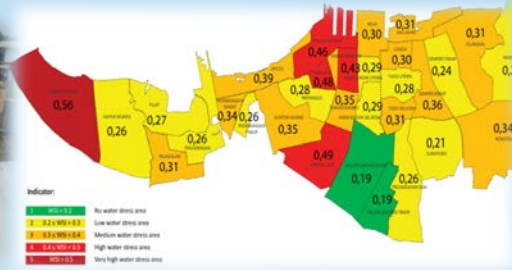


INDONESIA-AUSTRALI RESEARCH SUMMIT 2016

“Engineering Solutions in Leapfrogging to Water Sensitive Cities”

TUESDAY, AUGUST 23, 2016 @ UNIV. OF AIRLANGGA, SURABAYA-INDONESIA

DEVELOPMENT OF WATER BALANCE FOR URBAN WATER SECURITY SYSTEM & INFRASTRUCTURE IN INDONESIA



FIRDAUS ALI, PhD.

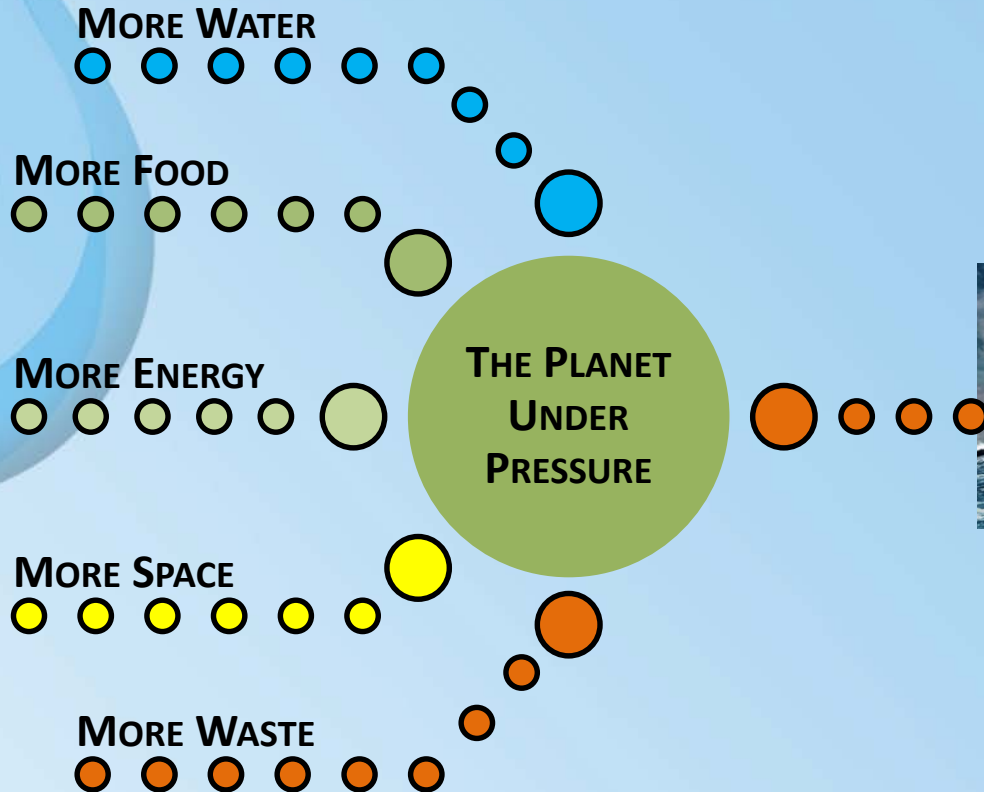
INDONESIA WATER INSTITUTE

ENVIRONMENTAL ENGINEERING-UNIVERSITY OF INDONESIA

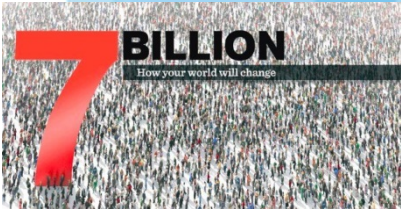
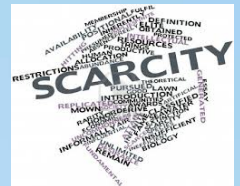
MINISTRY OF PUBLIC WORKS AND HOUSING

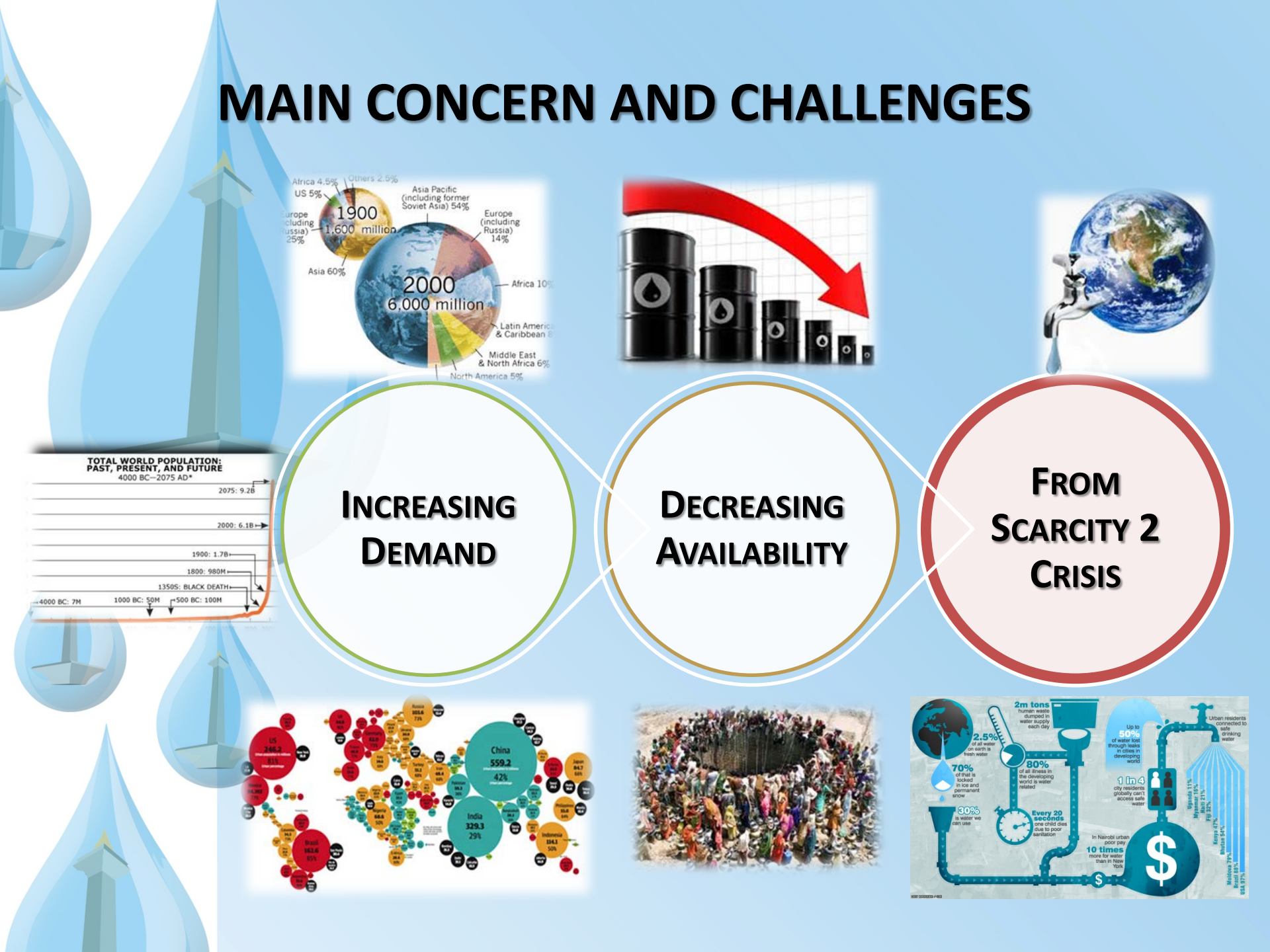
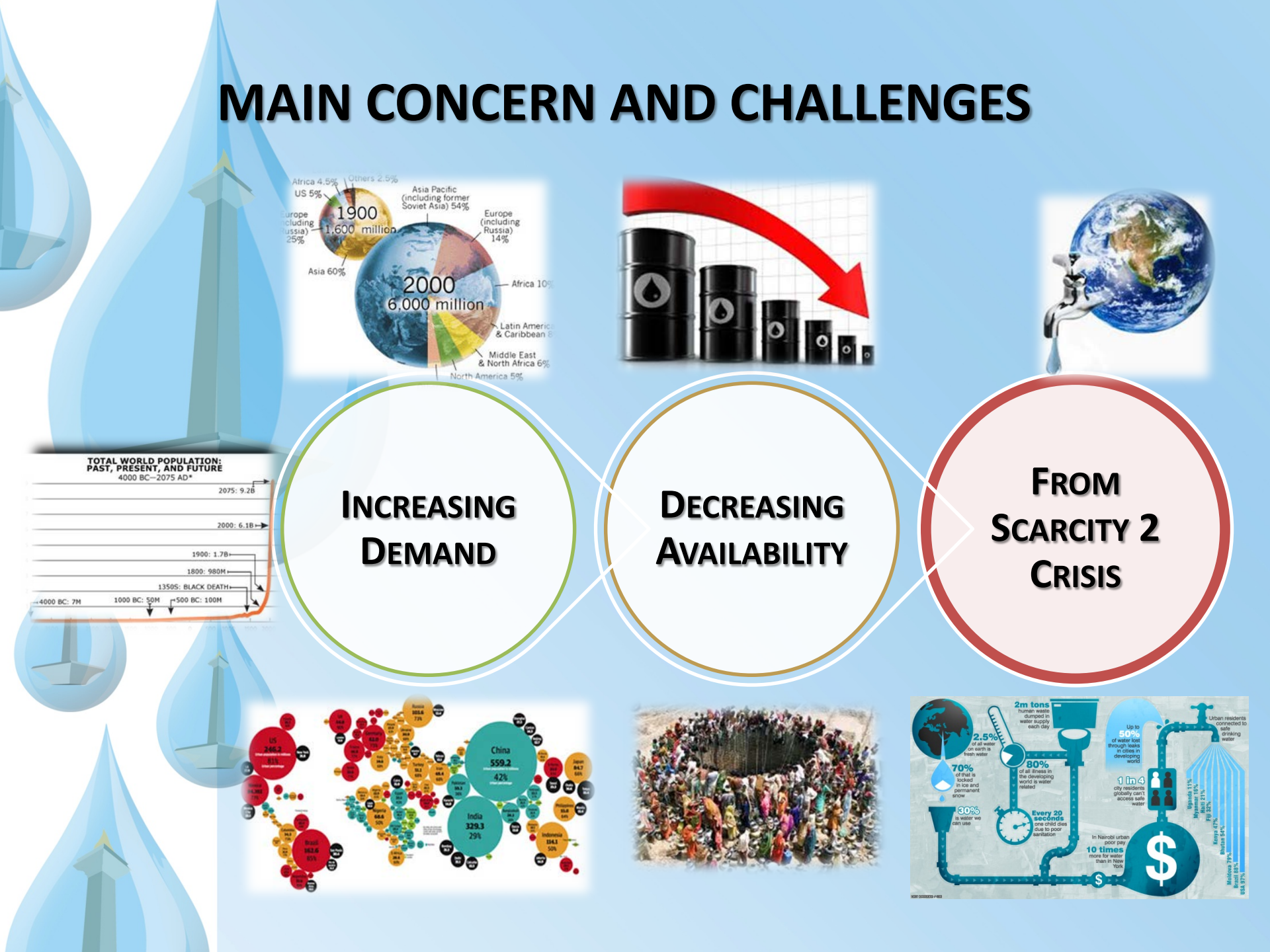
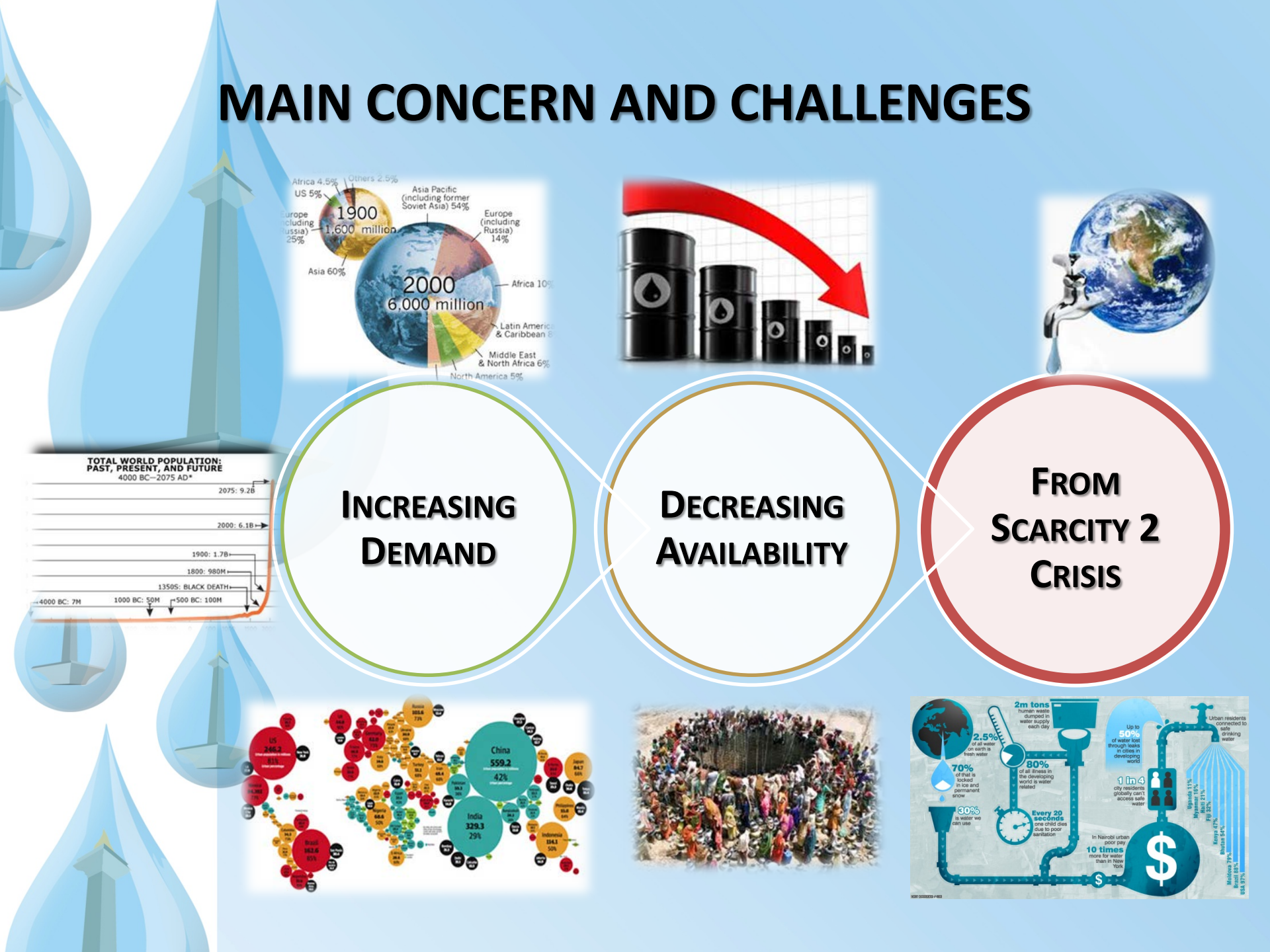


CIVILIZATION CHALLENGES



More people live in the cities while resources become very scarce!!!



[illegible][illegible]

MAIN CONCERN AND CHALLENGES

The infographic is set against a light blue background with large, stylized water droplets. At the top, the title 'MAIN CONCERN AND CHALLENGES' is written in large, bold, black letters. Below the title, three main circular nodes are arranged horizontally, connected by lines. The first node on the left is green and labeled 'INCREASING DEMAND'. It contains a line graph titled 'TOTAL WORLD POPULATION: PAST, PRESENT, AND FUTURE 4000 BC—2075 AD*' showing exponential growth from 7M in 4000 BC to 9.2B in 2075, and a pie chart showing world population distribution in 1900 and 2000. The second node in the middle is white with a gold border and labeled 'DECREASING AVAILABILITY'. It contains an illustration of five black oil barrels with a red arrow pointing down from the first to the last, symbolizing depletion. The third node on the right is pink and labeled 'FROM SCARCITY 2 CRISIS'. It contains an illustration of a globe with a faucet attached to it, dripping a single drop of water. Below the 'INCREASING DEMAND' node is a world map with colored circles representing population density in various countries, with labels for the US (246.2), China (559.2), India (329.3), and others. Below the 'DECREASING AVAILABILITY' node is a photograph of a large crowd of people gathered around a dry, cracked well. Below the 'FROM SCARCITY 2 CRISIS' node is a complex infographic showing water usage statistics: 2m tons of human waste dumped daily, 70% of water locked in ice/snow, 30% unusable, 80% of water in developing world lost to leaks, 1 in 4 city residents can't access safe water, and a comparison of water costs between the US and other countries.

INCREASING DEMAND

DECREASING AVAILABILITY

FROM SCARCITY 2 CRISIS

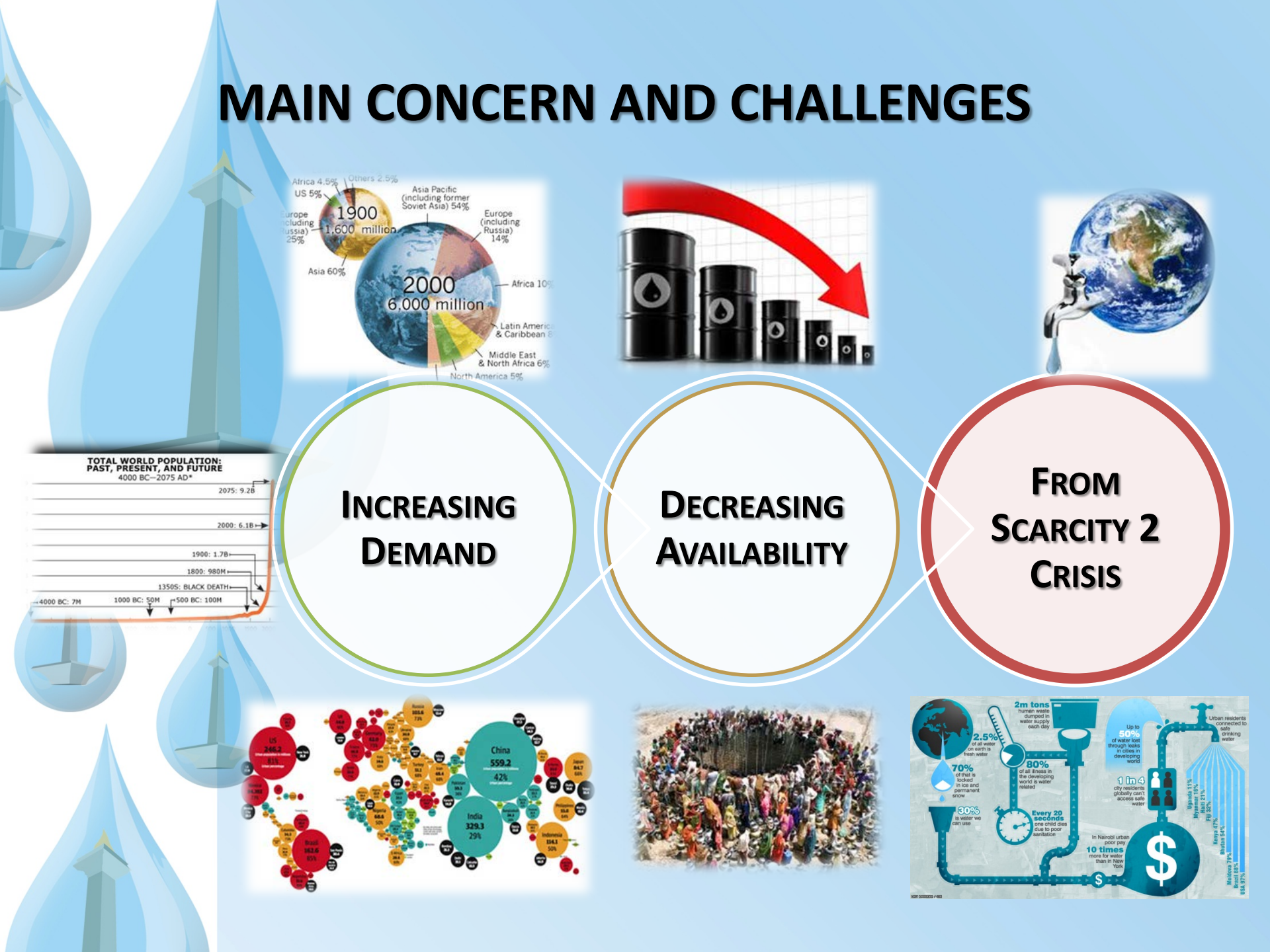
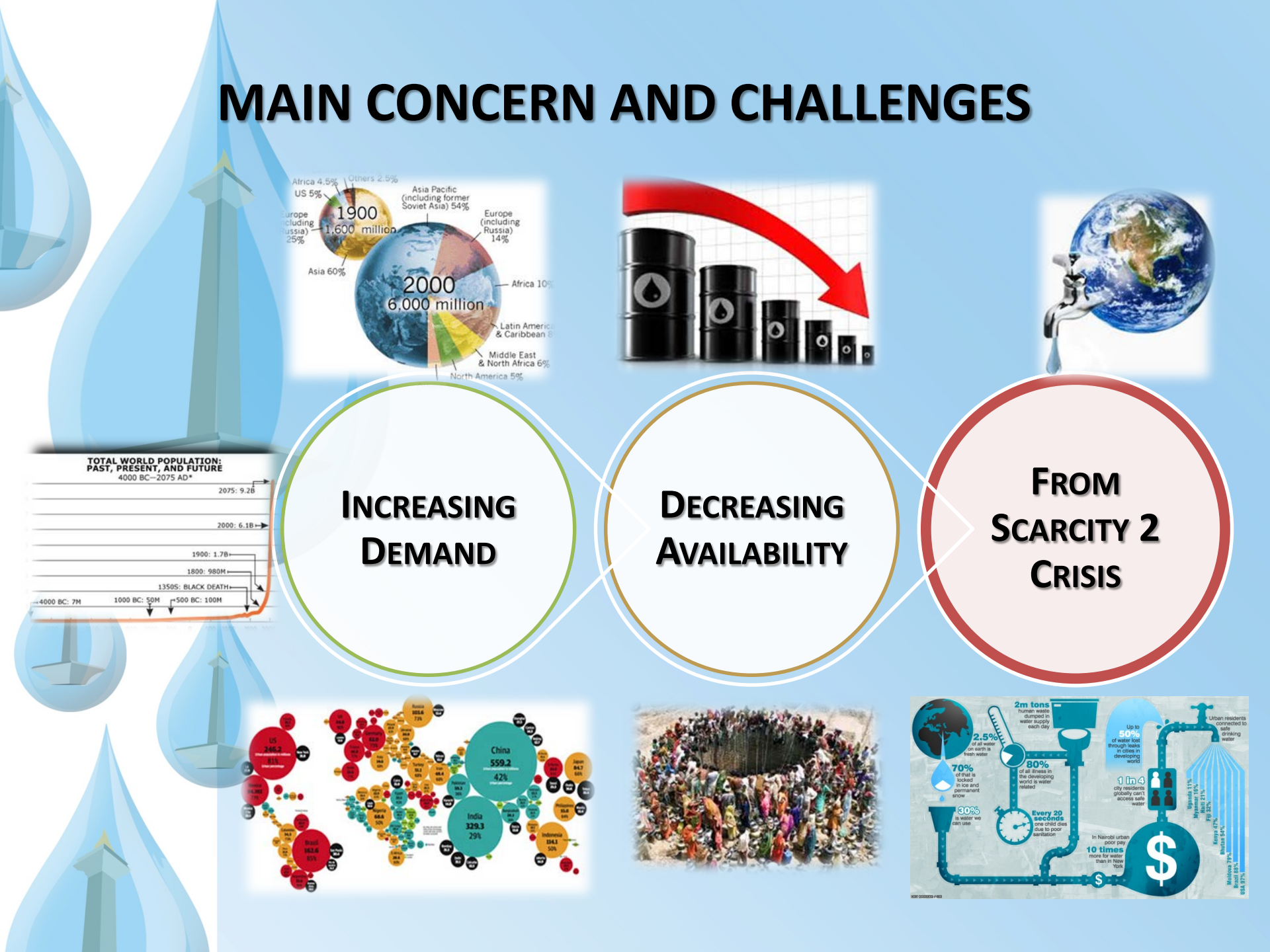
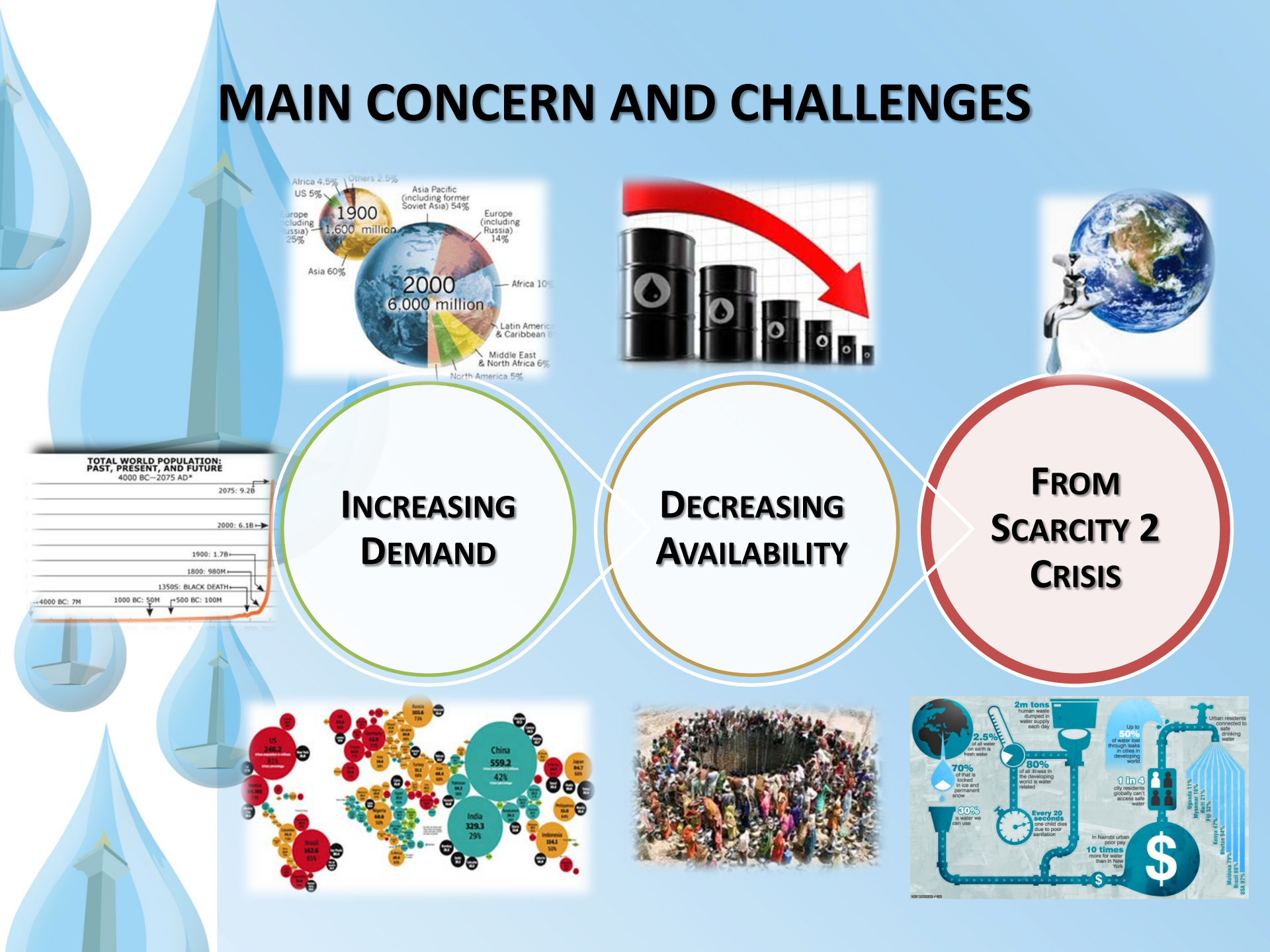
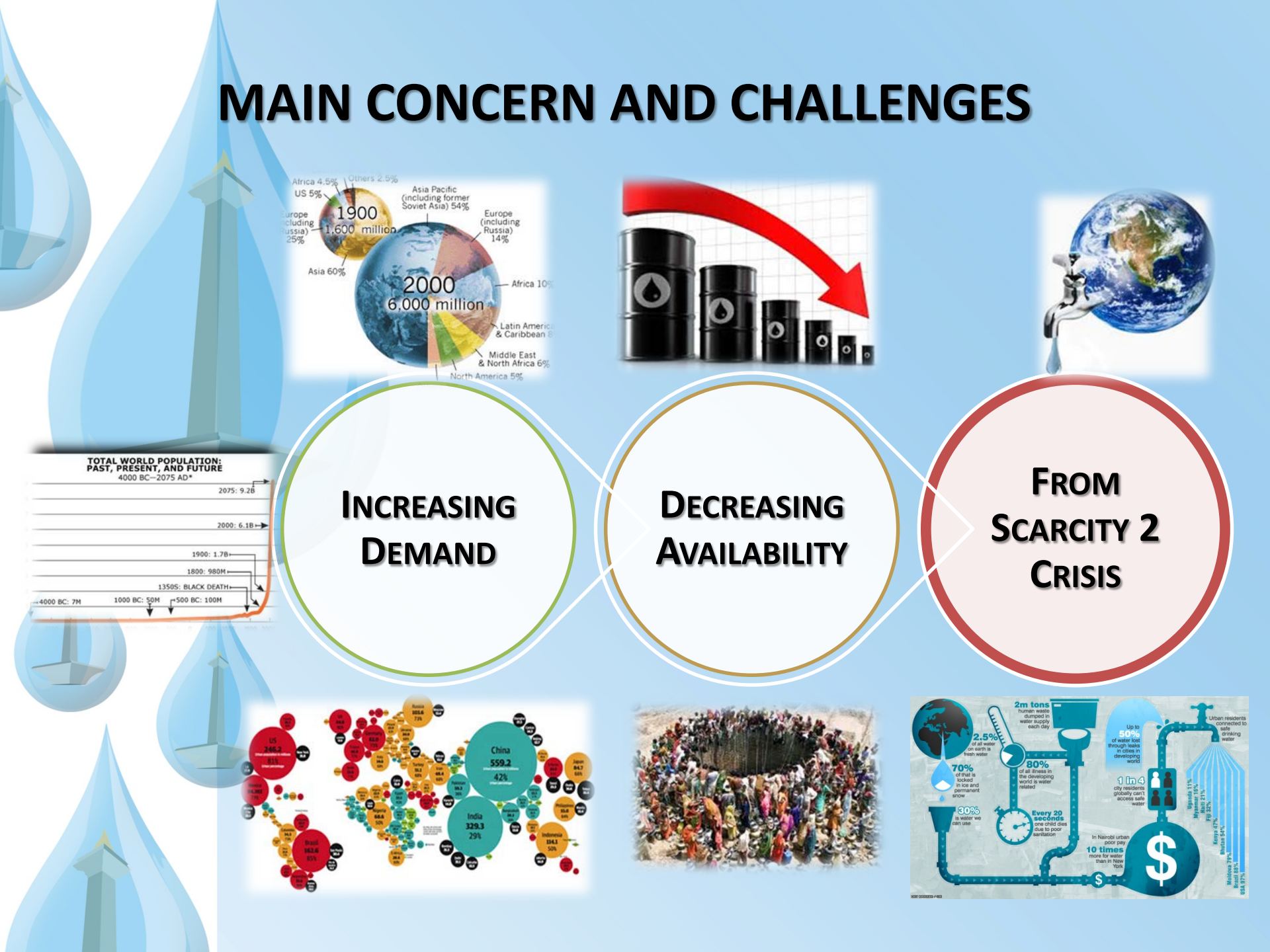
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INCREASING DEMAND

DECREASING AVAILABILITY

FROM SCARCITY 2 CRISIS



INDONESIA POPULATION AND URBANIZATION 2015 -2030



252 → 295 MILLION



**± 55%
URBAN
POPULATION
139,04
MILLION**



**± 45%
RURAL
POPULATION
113,76
MILLION**

INDONESIA INFRASTRUCTURE DEVELOPMENT CHALLENGES 2015-2019

INDONESIA GLOBAL COMPETITIVENESS INDEX (GCI)

Year	Ranking
2010 – 2011	44
2011 – 2012	46
2012 - 2013	50
2013 - 2014	38
2014 - 2015	34

INDONESIA INFRASTRUCTURE COMPETITIVENESS INDEX (GCI)

Year	Ranking
2010 – 2011	90
2011 – 2012	82
2012 - 2013	92
2013 - 2014	82
2014 - 2015	72

(sumber: Global Competitiveness Index, WEF, 2014)

CHALLENGES

FINISHING UP UNFINISHED PROJECT

TO CONTINUE AND SPEED UP
UNFINISHED PROJECTS UP TO
2014

NEW DEVELOPMENT

TO FULFILL
NAWACITA
MANDAT

CHALLENGES

DISPARITY

INTER-REGION DISPARITY
STILL VERY HIGH
(KBI & KTI)

URBANIZATION

STILL HIGH (53%
OF POPULATION IN
URBAN AREAS)

COMPETITI- VENESS

STILL LOW DUE TO
LIMITATION OF
INFRASTRUCTURE
SUPPORT AND
CONNECTIVITY

UTILIZATION OF RESOURCES

VERY LOW TO SUPPORT
WATER-FOOD-ENERGY
NEXUS SECURITY



ZONING OF WATER RESOURCES CONDITIONS

- ❑ WATER AVAILABILITY IS ADEQUATE
- ❑ HIGH POTENCY FOR DEVELOPMENT OF IRRIGATION AND SWAMP
- ❑ CHALLENGES ON FLOODS

- ❑ WATER AVAILABILITY IS ADEQUATE
- ❑ LIMITED POTENCY FOR DEVELOPMENT OF IRRIGATION AND SWAMP
- ❑ FLOOD PROBLEM IN SOME AREAS

- ❑ WATER AVAILABILITY IS ADEQUATE
- ❑ HIGH POTENCY FOR IRRIGATION
- ❑ CHALLENGES ON FLOODS

- ❑ HIGH WATER AVAILABILITY
- ❑ LIMITED POTENCY FOR DEVELOPMENT OF IRRIGATION AND SWAMP AREAS
- ❑ EMERGING FLOOD PROBLEMS

- ❑ WATER AVAILABILITY IS CRITICAL
- ❑ FOCUS ON UPGRADING OF THE EXISTING IRRIGATION SCHEME
- ❑ FLOOD MANAGEMENT IS VERY DEMANDING THROUGHOUT THE AREAS

- ❑ WATER AVAILABILITY IS CRITICAL
- ❑ DEVELOPMENT ON SELECTIVE IRRIGATION SCHEME
- ❑ FLOOD PROBLEMS ARE RELATIVELY LOW

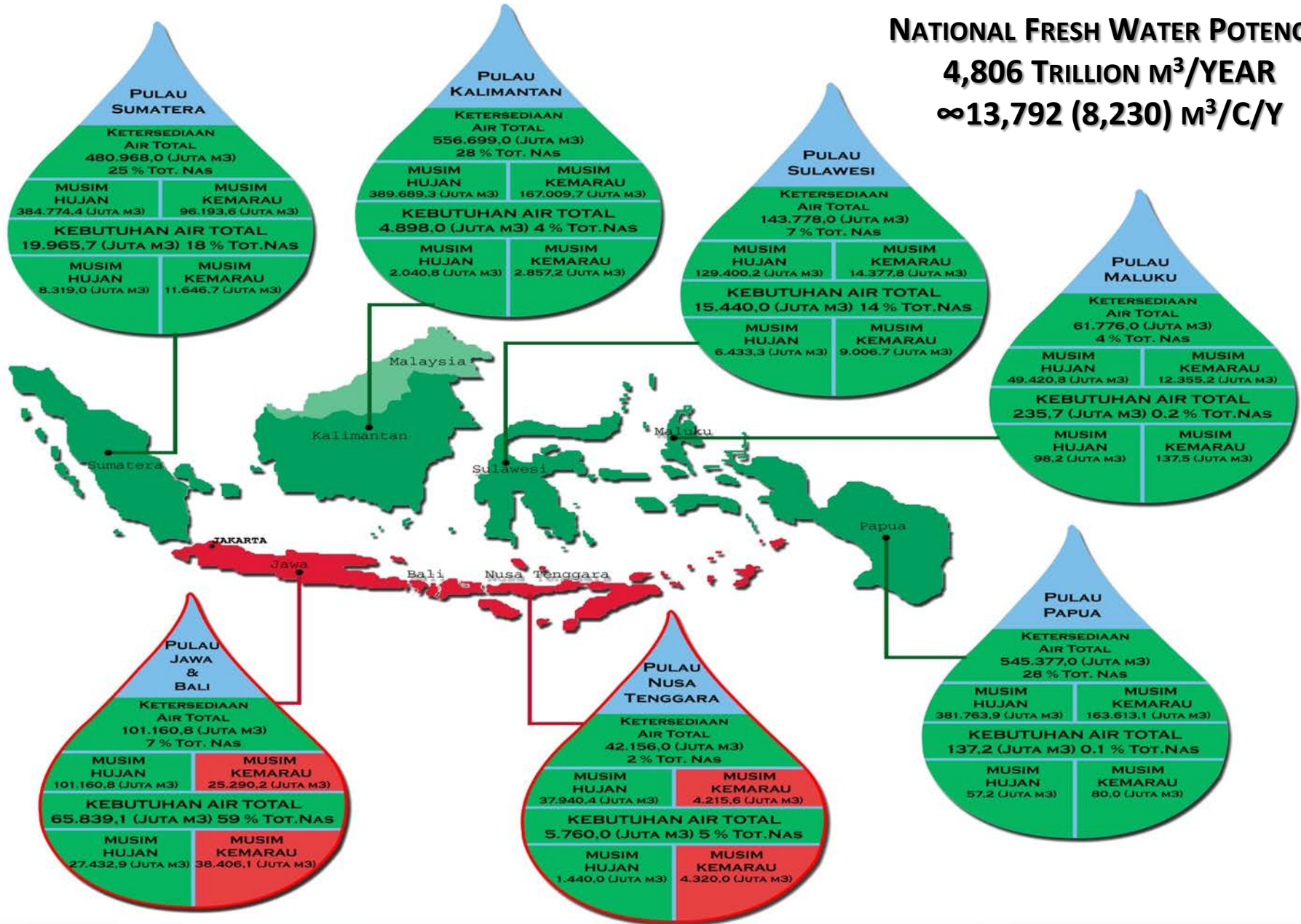


INDONESIA FRESH WATER BALANCE

NATIONAL FRESH WATER POTENCY:

4,806 TRILLION M³/YEAR

≈13,792 (8,230) M³/C/Y



NATIONAL RAW WATER INFRASTRUCTURE

(284 RESERVOIR= 12,973 BILLION M³)

INDIA = 1.500 DAMS, JAPAN = 3.000 DAMS, UAS = 6.000 DAMS, CHINA = 20.000 DAMS

MIN. OF PWH:
261

SUMATERA: 9

JAWA: 161

BALI & NTT: 80

KALIMANTAN: 5

SULAWESI &
MALUKU: 6

PLN:
(12)

SUMATERA: 3

JAWA: 7

BALI & NTT: 0

KALIMANTAN: 1

SULAWESI: 1

PRIVATE:
(11)

SUMATERA: 4

JAWA: 2

BALI & NTT: 0

KALIMANTAN: 3

SULAWESI &
MALUKU: 2

RAW WATER, IRRIGATION, INDUSTRY, HYDROPOWER, MUNICIPALITY

RAW WATER CONDITION & PLAN TO MEET NATIONAL WATER SUPPLY DEMAND



2014

- SERVICE COVERAGE: 29%
- HOUSE CONNECTION: 8,7 MILLION
- RW AVAILABILITY: 56 M³/SECOND
- TOTAL RW DEMAND: 111,8 M³/SECOND
- TOTAL DEMAND: 385,6 M³/SECOND
- NATIONAL BUDGET FOR WATER SUPPLY SECTOR IN 2014: RP. 5.7 TRILLION (NATIONAL FISCAL CAPACITY IN 2014 RP. 1.842,5 TRILLION (0.31%)



2030

- SERVICE COVERAGE: 51%
- HOUSE CONNECTION: 30,1 MILLION
- RW AVAILABILITY: 359,1 M³/SECOND
- TOTAL RW DEMAND: 359,1 M³/SECOND
- TOTAL DEMAND: 704,2 M³/SECOND
- CAPEX DEMAND: RP. 159 T WITH TOTAL FISCAL CAPACITY IN 2030 BECOME RP. 8.600 TRILLION (1,85%)

NOTE: - CLEAN WATER CONSUMPTION RATE @ 90 L/CAPITA/DAY (2015) & 150 L/CAPITA/DAY (2030)
- NATIONAL NRW AVERAGE: 33,1% (2015) & 25% (2030)

WATER BALANCE: MANAGING SUPPLY AND DEMAND

SUPPLY:

**QUANTITY, QUALITY AND
SUSTAINABILITY**

INCREASE THE CAPACITY

**(NEEDED WATER
INFRASTRUCTURES)**

PROTECT & SUSTAIN WATER SOURCES

**(LAW ENFORCEMENT &
INFRASTRUCTURE)**

DEMAND:

**CONTROL, MANAGE AND
INNOVATE**

**INTRODUCE
DEMAND
MANAGEMENT &
STRONGLY DECREASE
INEFFICIENCY**

**ENCOURAGE USED
WATER REUSE**

DEVELOP AND UP DATE NATIONAL & LOCAL WATER BALANCE

CHALLENGES IN ACCELERATING THE DEVELOPMENT OF INFRASTRUCTURE

LAND
ACQUISITION



REGULATORY SUPPORT



GOVERNMENT
FISCAL CAPACITY



COORDINATION
AMONG STAKEHOLDERS

STRATEGIES FOR INCREASING URBAN WATER SECURITY



DEVELOPMENT OF URBAN WATER BALANCE

CONTROLLING WATER CONSUMPTION AND DEMAND

DECREASING LEVEL OF NON REVENUE WATER

IMPLEMENTATION AND POLICY FOR RE-USED WATER PROGRAMME

CHANGING PATTERNS AND PRINCIPLES OF FLOOD CONTROL CONVENTIONAL

BUILD AWARENESS AND CAPACITY OF COMMUNITIES AND BUSINESSES

HOT TO ADDRESS AND SOLVE IT?



INSTITUTIONAL REFORM

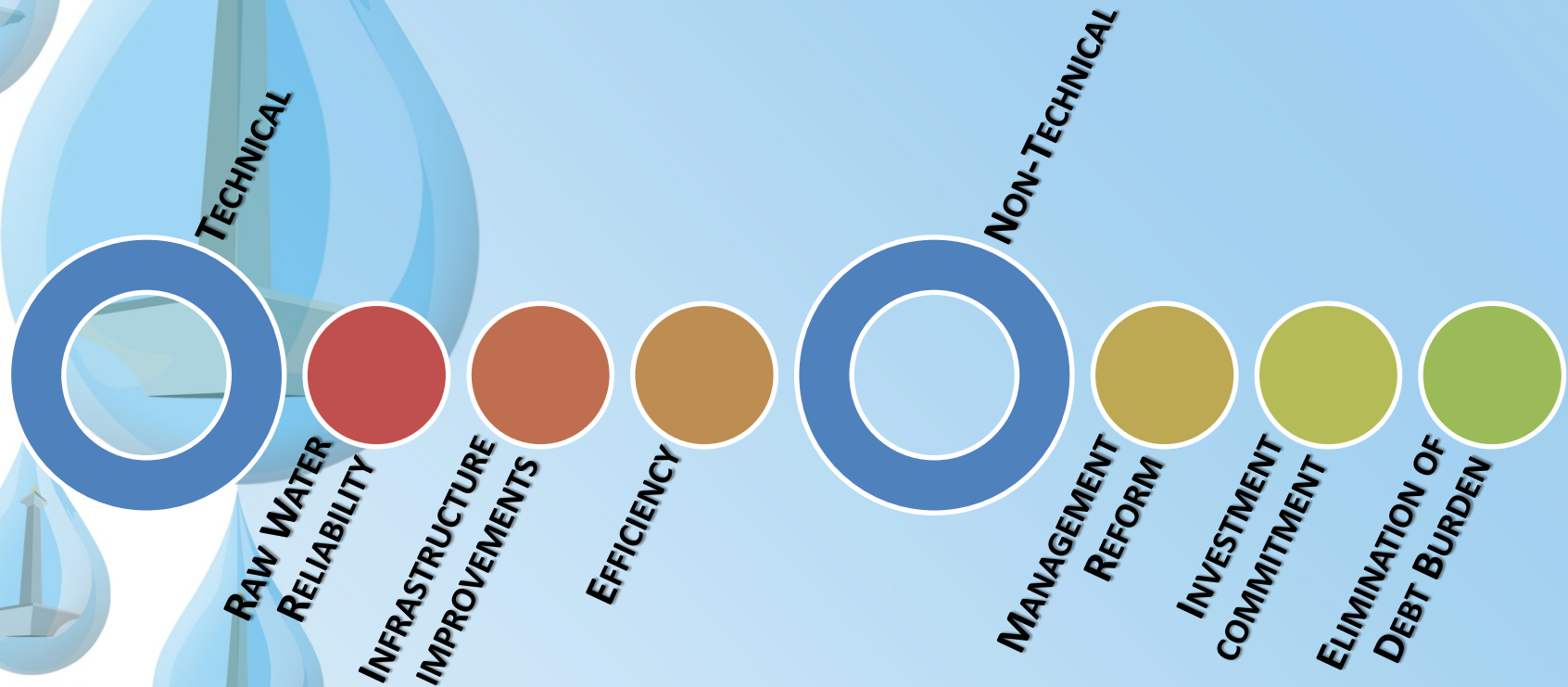
SMART HR CAPACITY BUILDING

STRONG COMMITMENT AND LEADERSHIP

POLITICAL BUDGET REFORM

ADVANCED TECHNOLOGY INVOLVEMENTS

FROM REALITY TO THE ACHIEVEMENT THE TARGET



BECAUSE OF THE FISCAL CAPACITY LIMITATIONS GOVERNMENT, PRIVATE ROLES IN SCHEME PPP REQUIRED BUT NEED RULES AND CLARITY AND CERTAINTY

POLICY ON WATER SECURITY

STRATEGIC PLAN (2015-2019)



- ✓ THE DEVELOPMENT OF **50** NEW HIGH DAMS (INCREASE THE STORAGE CAPACITY FROM **17,4** BILLION M³ TO **20** BILLION M³)
- ✓ DEVELOPMENT OF **2.500** NEW SMALL DAMS (**500** NEW SMALL DAMS WILL BE CONSTRUCTED PER YEAR FOCUSING ON THE DROUGHT PRONE AREAS)
- ✓ IMPROVING CRITICAL LAKES AND DAMS
- ✓ REVITALIZING SMALL NATURAL LAKES (SITU)
- ✓ IMPROVING CATCHMENT AREAS BY EMPOWERING THE WATER CONSERVATION PROGRAMS, TO INCLUDE EROSION AND SEDIMENTATION MANAGEMENT THROUGHOUT INDONESIA

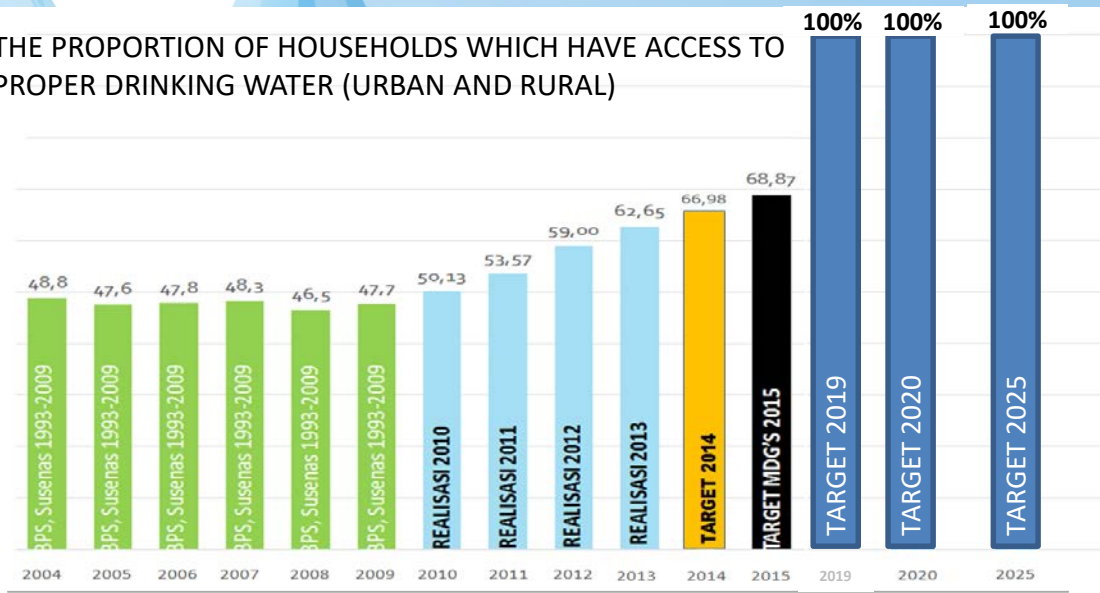
No	Island	Potential (SID)		On Going	
		Total (bh)	Vol (million m ³)	Total (bh)	Vol (jt m ³)
1	Sumatera	40	2.122,36	1	167,22
2	Jawa	81	1.403,54	16	1.942,54
3	Kalimantan	9	100,00	1	2,15
4	Bali & NT	16	170,27	7	128,42
5	Sulawesi	44	2.711,00	3	56,30
6	Maluku & Papua				
Total		190	6.507,17	28	2.296,63

WITH THE COMPLETION OF THE *ON GOING* DAMS (2017), WILL PROVIDE ADDITIONAL VOLUME OF 2.3 BILLION M³, BRINGING THE TOTAL TO 17.4 BILLION M³ (**± 73,42 M³ / CAPITA**) AND RESERVOIR IRRIGATION BECOME = **960.000 HA**

PROGRAM FOR ATTAINING THE RAW WATER SUPPLY

STRATEGIC PLAN 2015-2019

THE PROPORTION OF HOUSEHOLDS WHICH HAVE ACCESS TO PROPER DRINKING WATER (URBAN AND RURAL)



STRATEGIC PLANNING (2015-2019)

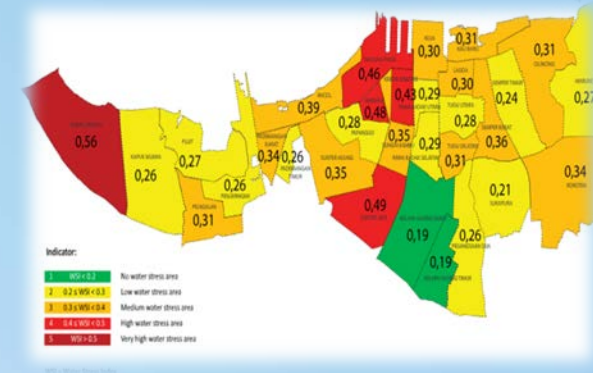
- ☐ AIMING TO SUPPORT THE COVERAGE OF CLEAN WATER SUPPLY 100 % IN 2019
- ☐ INCREASING THE RAW WATER SUPPLY FROM 56 M³/SECOND TO 114 M³/SECOND
- ☐ MANAGING “IDLE CAPACITY” OF RAW WATER SUPPLY
- ☐ PROVISION RAW WATER FOR OUTER ISLANDS

INDONESIA WATER INSTITUTE INVOLMENTS

- PROMOTE AND DEVELOP URBAN WATER BALANCE
- DEVELOP URBAN WATER STRESS AREA MAP
- PROMOTE USED WATER RECLAIM PROJECT FOR BUSINESSES ENTITIES

JAKARTA WATER BALANCE & WATER DEMAND 2010-2025						
No	DESIGN PARAMETER	UNIT	YEAR			
			2010	2015	2020	2025
1	TOTAL POPULATION (1,000)	CAPTA	11,437	12,333	13,272	14,258
2	SERVICE COVERAGE TARGET	%	70	80*	85	100
3	TRANSFERRED CONSUMPTION EXTRACTION LEVEL	%	30	00	05	01
4	TOTAL POP. SUPPLY (1,000)	CAPTA	8,006	9,866	11,945	14,258
5	DOMESTIC CONSUMPTION RATE	L/D	160	175	200	200
6	DOMESTIC WATER DEMAND	L/S	14,826	19,983	27,650	33,005
7	NON-DOMESTIC WATER DEMAND	L/S	4,892	6,594	9,125	10,892
8	NEW DOMESTIC WATER DEMAND	%	40	35	30	25
9	TOTAL WATER DEMAND	L/S	27,605	35,879	47,808	54,871
10	TOTAL RAW WATER DEMAND	L/S	28,985	37,673	50,199	57,614
11	TOTAL PRODUCTION CAPACITY	L/S	15,000	21,828	21,828	21,828
12	BULK WATER TREATED FROM TWR	L/S	2,800	2,800	0	0
13	WATER DEFICIT	L/S	11,185	13,945	28,370	35,784

Sources: Poldas AB, 2012



WATER MANAGEMENT HIERARCHY



SURFACE WATER (STATIC & DYNAMIC)



GROUNDWATER (DEEP & SHALLOW)



RE-USED WATER



WATER FROM DESALINATION PROCESS (SALT & BRACKISH WATER)

CHANGING THE PARADIGM

WASTE WATER

WASTE WATER

USED WATER

WISE WATER



Thank you



INDONESIA WATER INSTITUTE