Climate Resilient City and Urban Environmental Sustainability

JAKARTA
INDONESIA

International Urban Training Center
IUTC Training Leaders For a Sustainable Future

UN HABITAT
FOR A BETTER URBAN FUTURE

Logo/Identity of Jakarta Province

The emblem of Jakarta, featuring shield with images of Monas (National Monument), Rice and Cotton, Wave of Water, the words : Jaya Raya = The great Jakarta

The gold color on the edge of the shield, is a symbol of glory.
The red color in seloka, is the epitome of heroism.
The white color on the gate, is the symbol of sanctity.Pancasila
The white color in the National Monument, is a symbol of the glory of glorious creations.
The yellow color in rice, as well as green and white on cotton, is a symbol of prosperity and justice.
The blue color, is the symbol of free and wide space.
The white color in the waves, is the epitome of the ocean of love

Landmark of Jakarta Province

National Monument

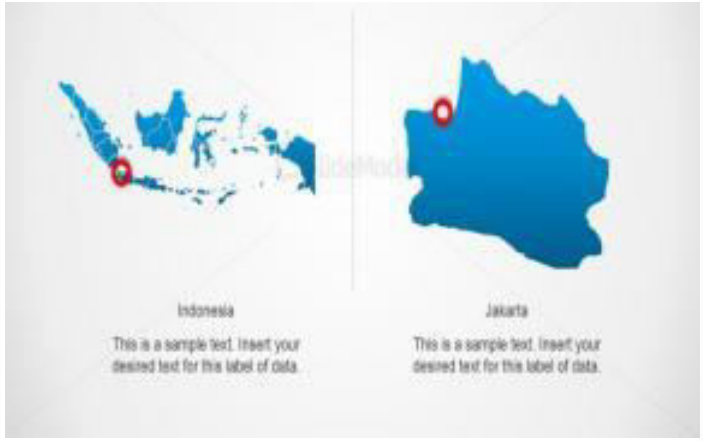
symbolizing the fight for Indonesia. It is the national monument of the Republic of Indonesia, built to commemorate the struggle for Indonesian independence

Fatahillah Museum

the building was built in 1710 as the *Sadhus* (city hall) of Batavia. Jakarta History Museum opened in 1974 and displays objects from the prehistory period of the city region, the founding of Jayakarta in 1527, and the Dutch colonization period from the 16th century until Indonesia's Independence in 1945.

Post Office at Fatahillah Square

Ondel-Ondel puppet figure



MAP OF THE STRUCTURE PLAN JABODETABEKPUNJUR

(Presidential Regulation number 4 year 2008)

SPATIAL PLAN DKI JAKARTA YEAR 2010 - 2030

LEGEND :

- NATIONAL ACTIVITY CENTER
  1. Provinsi DKI Jakarta
  2. Tanggerang
  3. Serpong
  4. Cinere
  5. Kota Bogor
  6. Kota Depok
  7. Cimanggis
  8. Cileungsi
  9. Setu
  10. Kota Bekasi
  11. Tambun
- Garis Pantai
- Jaringan Pelayaran Pariwisata
- Jaringan Pelayaran Penumpang
- Jaringan Pelayaran Antar Pulau
- Jaringan Pelayaran Internasional
- Garis Pantai Minus 8
- Batas Propinsi
- Jaringan Jalan Arteri
- Jaringan Jalan Tol
- Jaringan Angkutan Umum Massal

LAMPIRAN I :
PERATURAN DAERAH KHUSUS IBUKOTA JAKARTA NO. TAHUN
TENTANG
RENCANA TATA RUANG WILAYAH (RTRW) DKI JAKARTA

GUBERNUR KEPALA DAERAH KHUSUS
IBUKOTA JAKARTA

FAUZI BOWO

NO. PEMERIKSAAN GUBERNUR :

KETUA BAPPEDA :

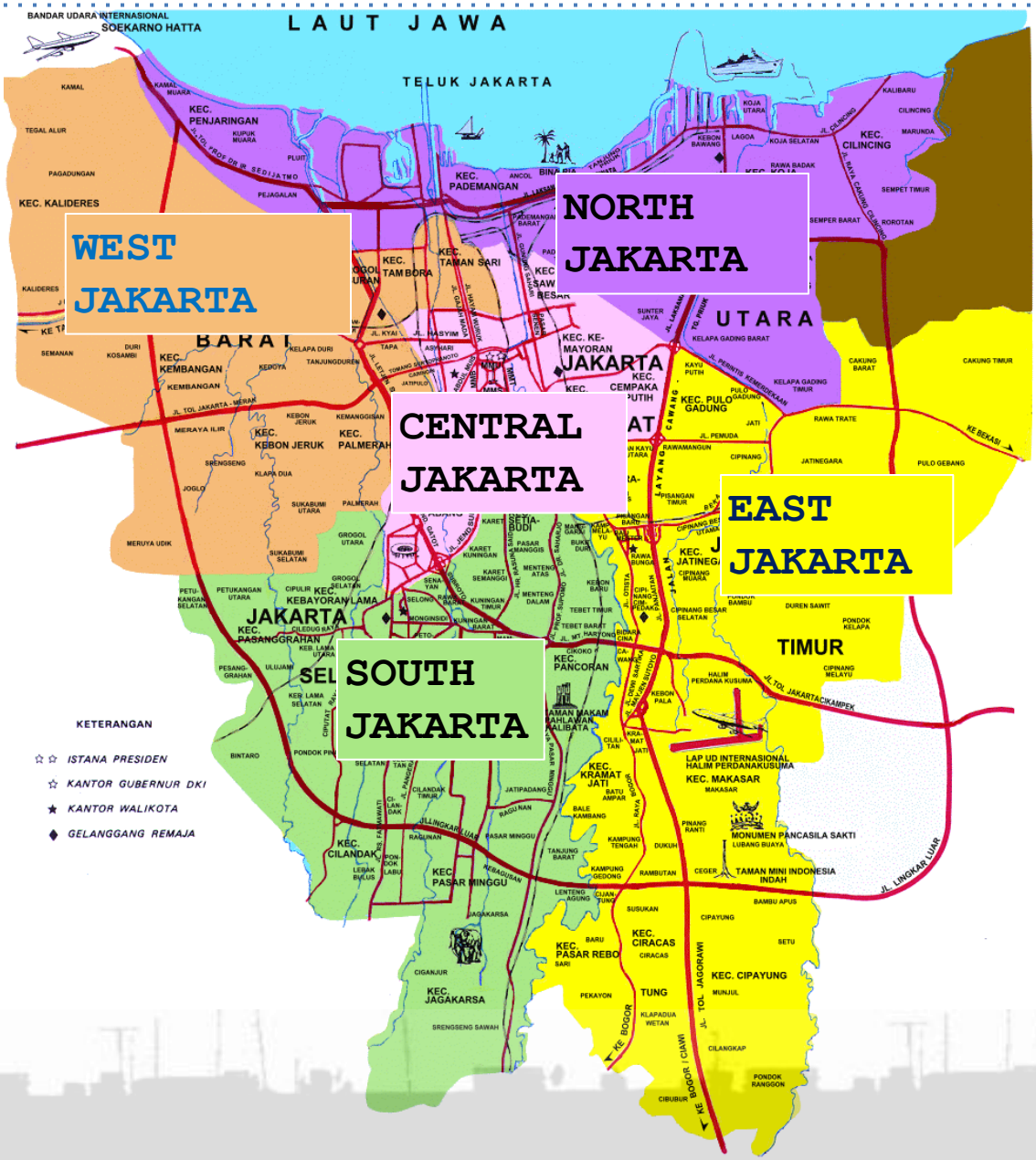
KEPALA DINAS TATA RUANG :

PEMERINTAH DAERAH KHUSUS IBUKOTA JAKARTA

U

SKALA
0 5 10 25 Km

Location of the Jakarta



CITIES

Thousand Islands Regency

Characteristic of the City

Jakarta's Cities/Municipalities (*Kota Administrasi/Kotamadya*)

City/Regency	Area (km^2)	Total population (2010 Census)	Total population (2014)[8]	Population Density (per km^2) in 2010	Population Density (per km^2) in 2014	HDI [67] 2015 Estimates
South Jakarta (*Jakarta Selatan*)	141.27	2,057,080	2,164,070	14,561	15,319	0.833 (Very High)
East Jakarta (*Jakarta Timur*)	188.03	2,687,027	2,817,994	14,290	14,987	0.807 (Very High)
Central Jakarta (*Jakarta Pusat*)	48.13	898,883	910,381	18,676	18,915	0.796 (High)
West Jakarta (*Jakarta Barat*)	129.54	2,278,825	2,430,410	17,592	18,762	0.797 (High)
North Jakarta (*Jakarta Utara*)	146.66	1,645,312	1,729,444	11,219	11,792	0.796 (High)
Thousand Islands (*Kepulauan Seribu*)	8.7	21,071	23,011	2,422	2,645	0.688 (Medium)

Climate data for Halim Perdanakusuma Airport, Jakarta, Indonesia (temperature: 1924–1994, precipitation: 1931–1994) [hide]

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °C (°F)	33.3 (91.9)	32.8 (91)	33.3 (91.9)	33.3 (91.9)	33.3 (91.9)	33.3 (91.9)	34.4 (93.9)	35.6 (96.1)	35.6 (96.1)	35.6 (96.1)	35.6 (96.1)	33.9 (93)	35.6 (96.1)
Average high °C (°F)	28.9 (84)	28.9 (84)	29.4 (84.9)	30.0 (86)	30.6 (87.1)	30.0 (86)	30.0 (86)	30.6 (87.1)	31.1 (88)	31.1 (88)	30.6 (87.1)	29.4 (84.9)	30.1 (86.2)
Daily mean °C (°F)	26.1 (79)	26.1 (79)	26.4 (79.5)	27.0 (80.6)	27.2 (81)	26.7 (80.1)	26.4 (79.5)	26.7 (80.1)	27.0 (80.6)	27.2 (81)	27.0 (80.6)	26.4 (79.5)	26.7 (80.1)
Average low °C (°F)	23.3 (73.9)	23.3 (73.9)	23.3 (73.9)	23.9 (75)	23.9 (75)	23.3 (73.9)	22.8 (73)	22.8 (73)	22.8 (73)	23.3 (73.9)	23.3 (73.9)	23.3 (73.9)	23.3 (73.9)
Record low °C (°F)	20.6 (69.1)	20.6 (69.1)	20.6 (69.1)	20.6 (69.1)	21.1 (70)	19.4 (66.9)	19.4 (66.9)	19.4 (66.9)	18.9 (66)	20.6 (69.1)	20.0 (68)	19.4 (66.9)	18.9 (66)
Average precipitation mm (inches)	299.7 (11.799)	299.7 (11.799)	210.8 (8.299)	147.3 (5.799)	132.1 (5.201)	96.5 (3.799)	63.5 (2.5)	43.2 (1.701)	66.0 (2.598)	111.8 (4.402)	142.2 (5.598)	203.2 (8)	1,816 (71.495)
Average relative humidity (%)	85	85	83	82	82	81	78	76	75	77	81	82	80.6
Mean monthly sunshine hours	189	182	239	255	260	255	282	295	288	279	231	220	2,975

Source #1: Sistema de Clasificación Bioclimática Mundial[76]

Source #2: Danish Meteorological Institute (humidity and sun only)[77]

Characteristic of the City

GROSS DOMESTIC PRODUCT JAKARTA

Kelompok pengeluaran	PDRB Atas Dasar Harga Berlaku menurut Pengeluaran (Juta Rupiah)						
	2010	2011	2012	2013	2014	2015	2016
Pengeluaran Konsumsi Rumahtangga	156 685 837.99	172 708 828.79	191 140 005.78	219 585 864.75	247 935 866.67	270 227 204.18	294 355 802.24
Pengeluaran Konsumsi LNPRT	3 135 624.83	3 503 503.77	3 976 384.30	4 421 655.12	5 845 590.40	5 912 117.96	6 664 428.89
Pengeluaran Konsumsi Pemerintah	6 666 566.80	7 613 564.57	8 662 431.03	9 899 707.59	10 431 351.81	11 273 671.14	11 967 237.64
Pembentukan Modal Tetap Bruto	102 967 189.37	114 437 217.62	135 405 287.19	144 433 127.84	159 528 207.97	171 910 907	179 749 397.87
Perubahan Inventori	3 042 239.58	376 938.36	509 925.29	1 461 587.45	1 897 693.72	2 151 222.45	2 164 828.43
Ekpor Barang dan Jasa	32 025 941.22	38 912 446.96	48 072 825.98	55 704 902.65	60 623 109.06	71 884 958.38	69 415 147.31
Dikurangi Impor Barang dan Jasa	122 502 515.23	131 601 382.09	159 384 394.86	176 829 063.95	193 280 104.72	204 963 245.86	205 071 680.88
Produk Domestik Regional Bruto	182 020 884.57	205 951 117.97	228 382 464.71	258 677 781.45	292 981 714.92	328 396 835.25	359 245 161.50

GROSS DOMESTIC PRODUCT per CAPITA

Provinsi	[Seri 2010] Produk Domestik Regional Bruto Per Kapita (Ribu Rupiah)						
	Harga Berlaku						
	2010	2011	2012	2013	2014	2015	2016
RIAU	69 701.03	84 811.19	94 996.15	100 691.44	109 784.64	102 789.58	104 961.41
JAMBI	29 160.16	32 682.04	35 657.57	39 553.64	43 300.30	45 591.97	49 643.00
SUMATERA SELATAN	25 932.00	29 830.37	32 830.49	35 810.16	38 584.88	41 341.24	43 551.46
BENGKULU	16 463.68	18 368.80	20 298.91	22 358.05	24 604.40	26 847.20	29 085.84
LAMPUNG	19 722.39	21 981.47	23 910.84	25 768.94	28 755.17	31 195.86	34 260.61
KEP. BANGKA BELITUNG	28 906.78	32 465.38	35 288.32	38 314.56	41 948.37	44 428.55	46 457.43
KEP. RIAU	65 703.34	72 571.75	80 240.25	87 710.29	94 335.33	101 132.41	106 785.92
DKI JAKARTA	111 528.86	125 533.82	138 858.29	155 153.92	174 914.36	195 455.33	211 830.97
JAWA BARAT	20 974.94	23 251.17	25 272.29	27 767.25	30 107.21	32 644.96	34 879.92
	19 209.31	21 162.83	22 865.43	24 952.13	27 517.84	29 959.34	32 100.53

Source : https://www.bps.go.id/

Key Vulnerability

- Flood

Variables cause flood:

1. Extrem weather; trend of long period of rainfall
2. Urban issues:

- Problem to water absorption- (misdrainage system, lack of open space, uncontrolled urban construction like building coefficient) → land-use data
- Long period of evaporation issue due to lack of vegetation (open space), blue artificial (dam, lake, reservoir, river, riverine, etc)
- Squatter and slum areas.

3. Sea level rise
4. Uncontrolled underground water exploitation

AVERAGE MONTHLY RAINY DAYS OVER THE YEAR

This is the number of days each month with rain, snow, hail etc.

FLOOD MAP AREA

River Location

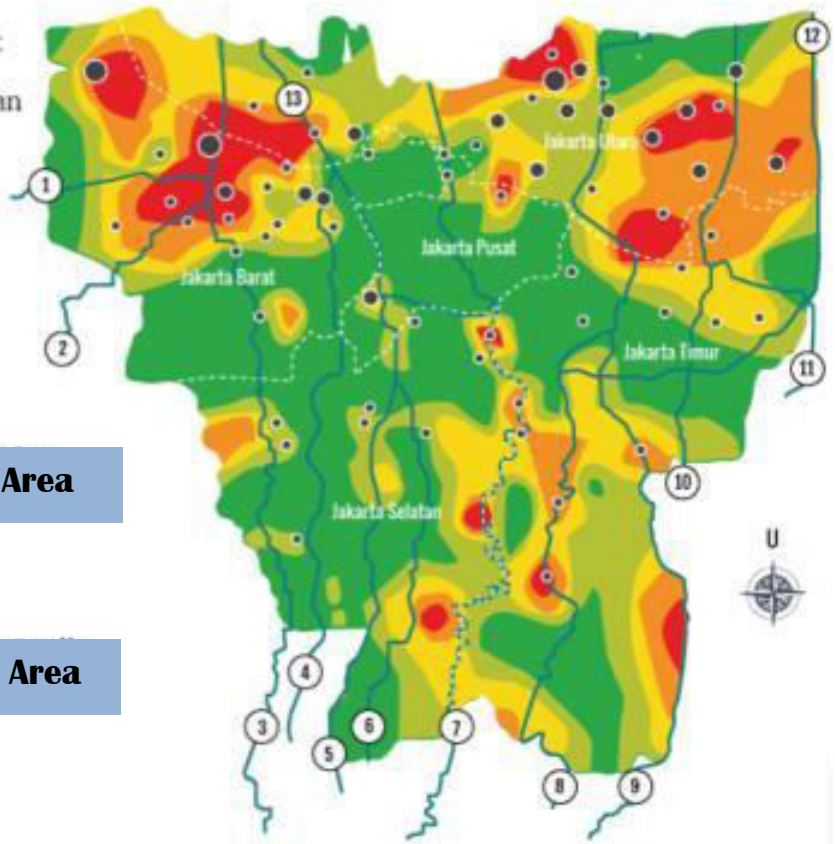
1. Sungai Mookervaart
2. Sungai Angke
3. Sungai Pesanggrahan
4. Sungai Grogol
5. Sungai Krukut
6. Sungai Mampang
7. Sungai Ciliwung
8. Sungai Cipinang
9. Sungai Sunter
10. Sungai Buaran
11. Sungai Cakung
12. Kanal Banjir Timur
13. Kanal Banjir Barat

No of Evacuation Area

- 1 - 5
- 6 - 13
- 14 - 23

Percentage Flood Area

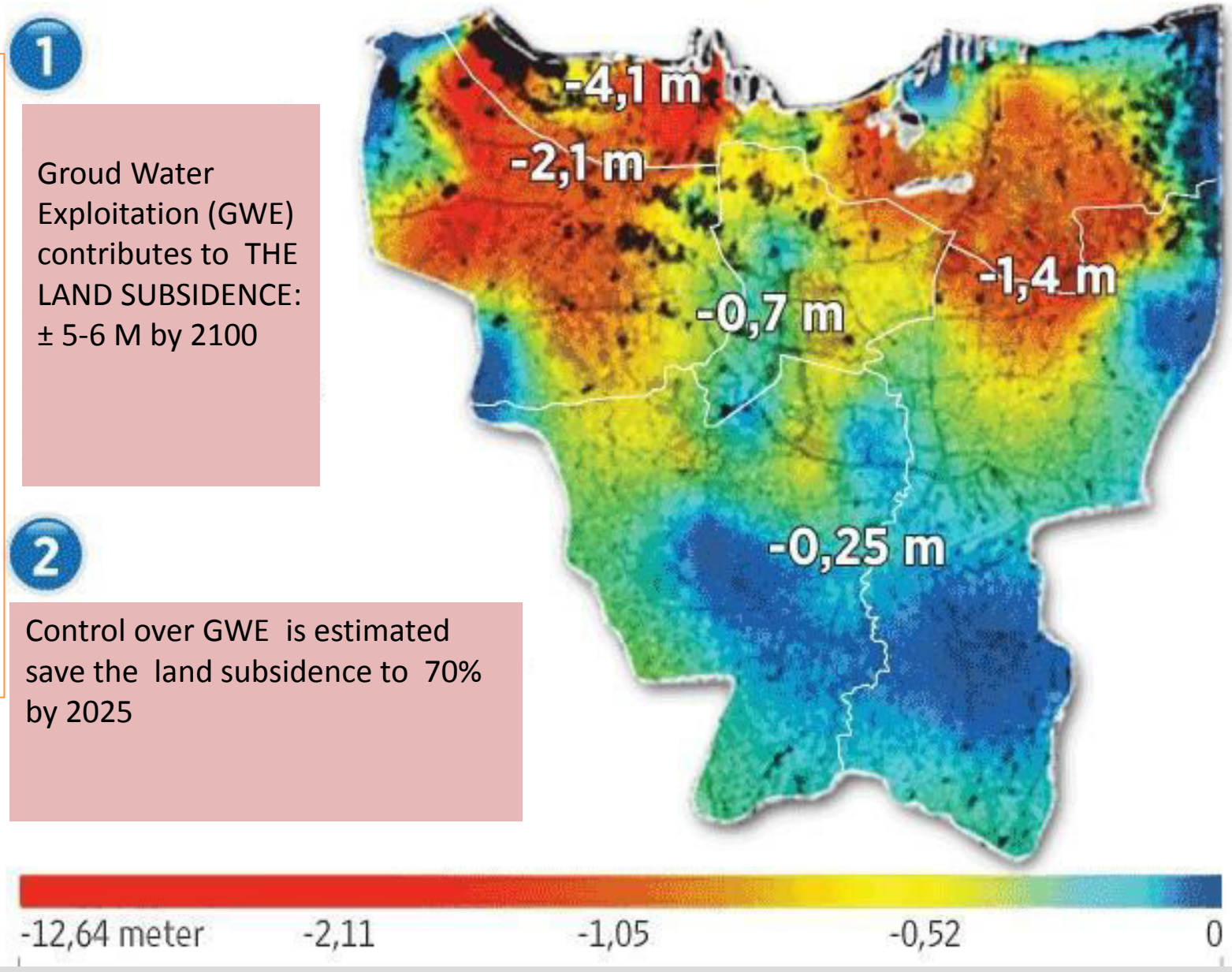
- < 20 %
- 21 - 40 %
- 41 - 60 %
- 61 - 80 %
- 81 %

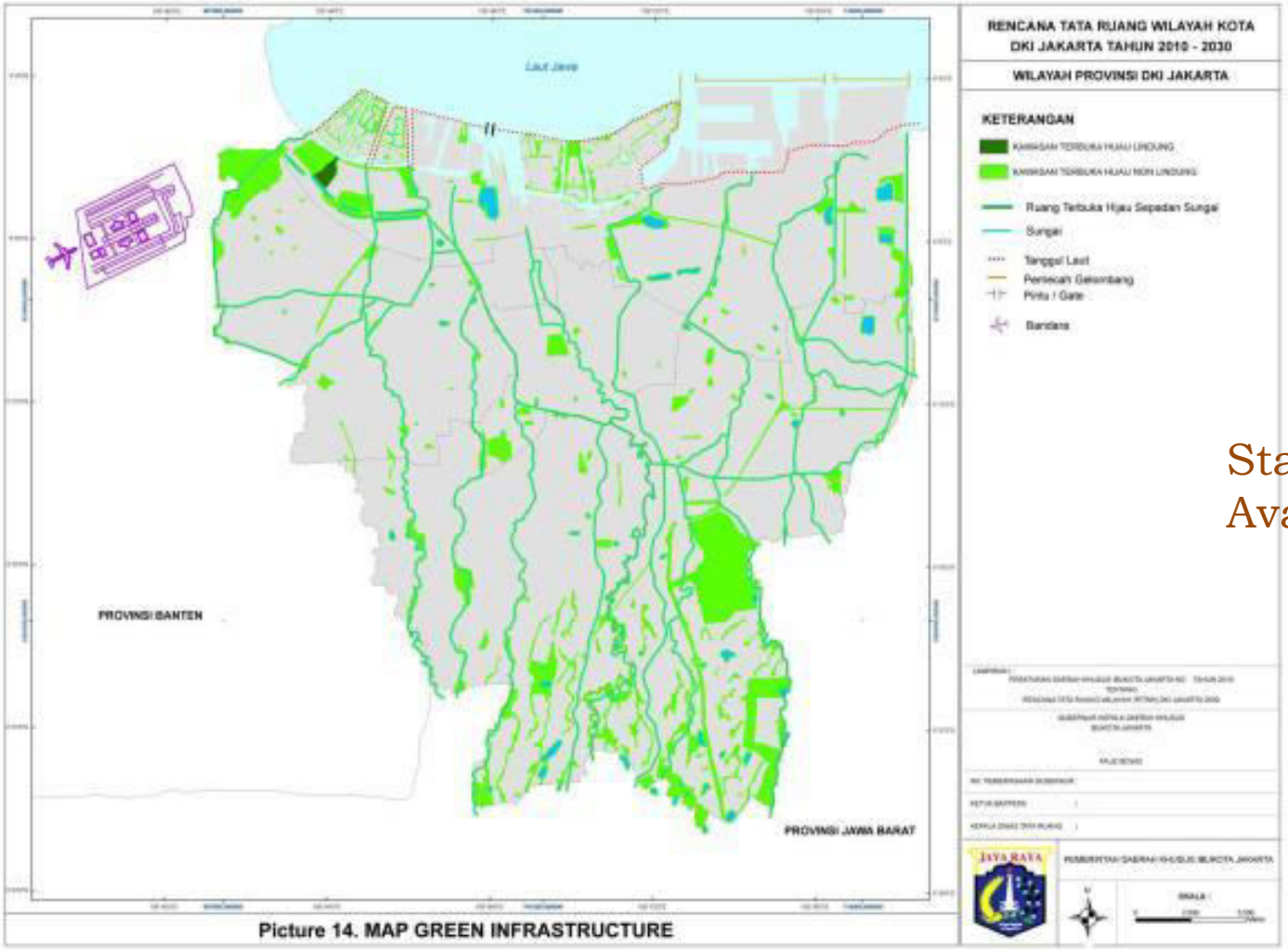


SCENARIO

1. Groud Water Exploitation (GWE) contributes to THE LAND SUBSIDENCE: ± 5-6 M by 2100

2. Control over GWE is estimated save the land subsidence to 70% by 2025





Picture 14. MAP GREEN INFRASTRUCTURE

OPEN PUBLIC/ GREEN SPACE

Statutory Plan: 30%
Available: 10 %

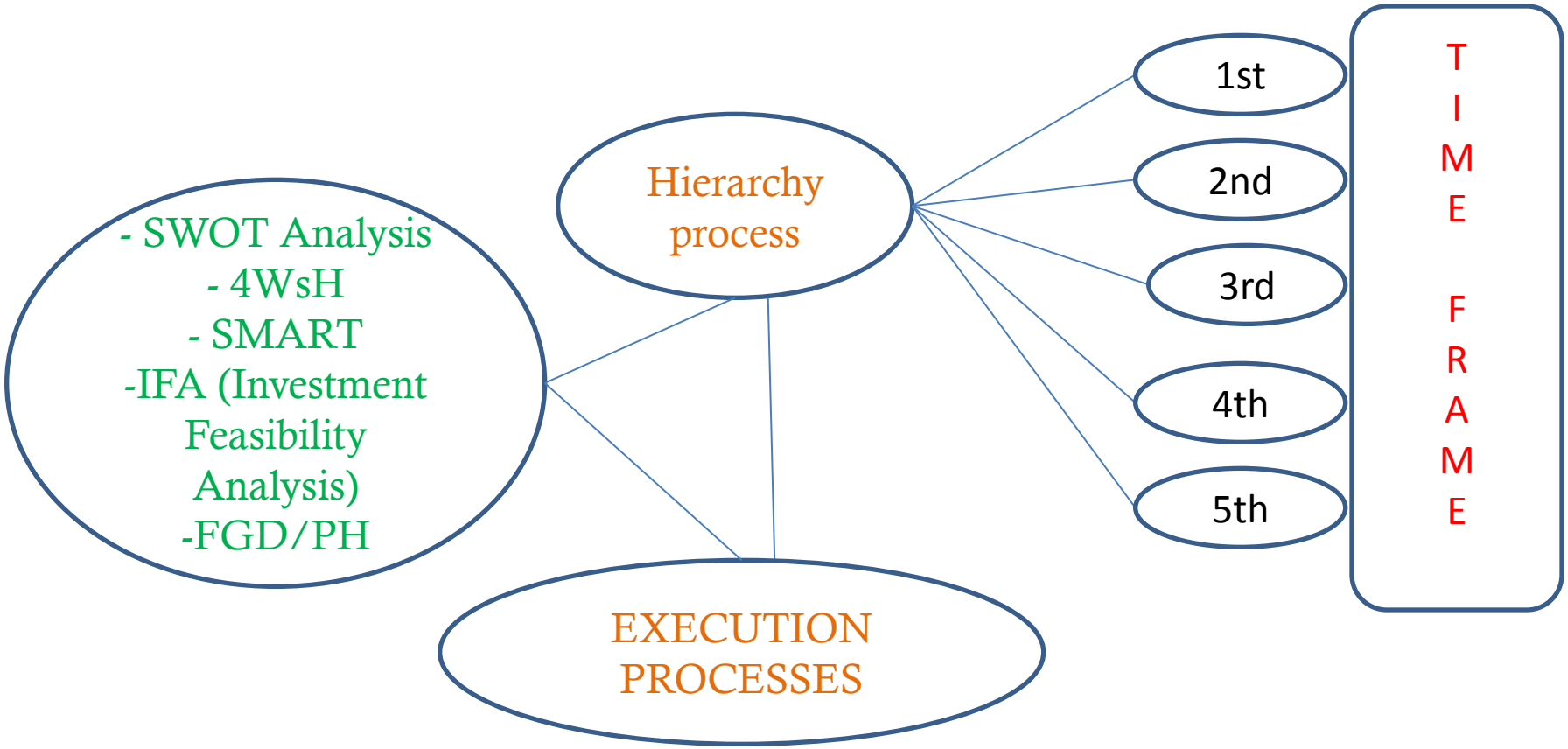
Goal

Capacity of megapolitan (JABODETABEK) to cope Jakarta Flood is upgraded by 2025.

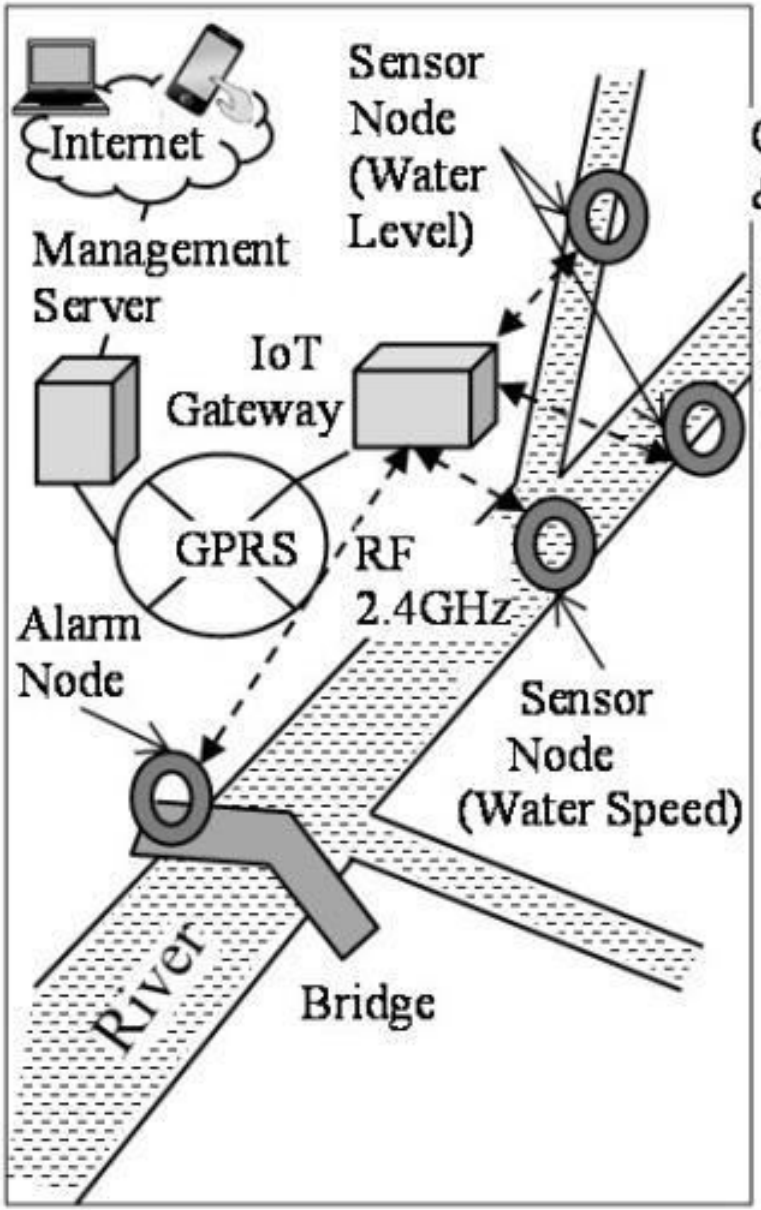
Strategy:

- Smart and green drainage system management
- Smart green building and innovative construction (biopore structure design, green infrastructure, integrated city plumbing system—multi benefits)
- iant seawall (video)
- Forest restoration up to 200 per cent by 2025 at upstream region
- Compact city platform and affordable housing development in the city.

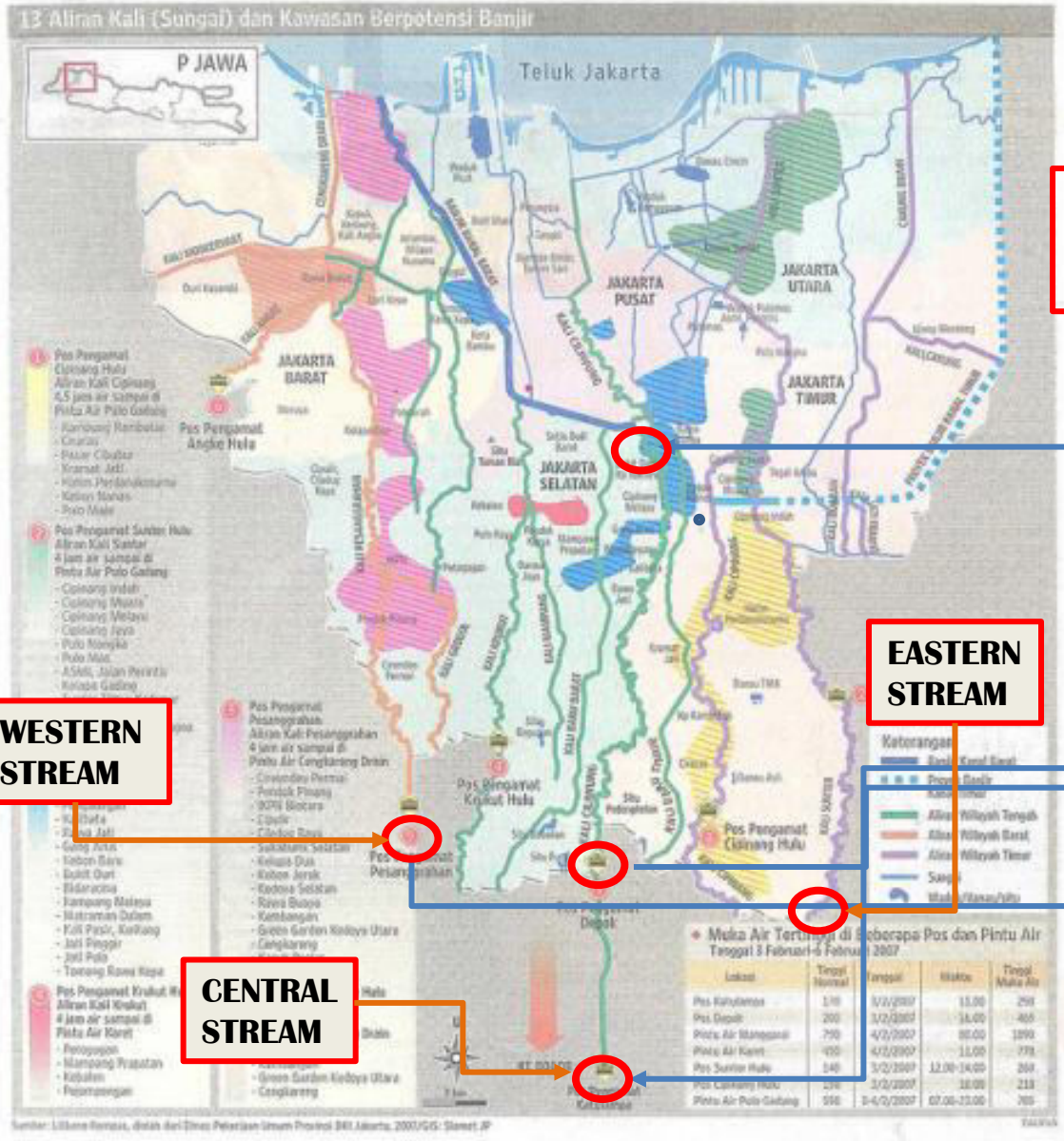
Action Plan Flow



Action Plan	Projects	Mitigation	Adaptation	Stakeholder	Financial Resources	Location	Timeframe
Smart and green drainage system management	1. Dam Smart Early warning system 2. Tree Pits	To save 8 hours time prior to occasion	- Automatic chanelization process	-Public Works Ministry - Natial Development Planning Agency -- Financial Ministry - Jakarta Water Resource Department	Internation Banks covers 40 per cent and the rest belongs to Central and Jakarta Prov Gov 40 per cent and 20 per cent respectively.	Katulampa, Manggarai, etc	-Environmental Asessement /Feasibility Study as well as Master Plan: 2018-2020. - DED: 2020-2021. - Action: 2021-2023. -



Smart Drainage System



AUTOMATIC CHANALISASTION PROCESS

West Flood Canal

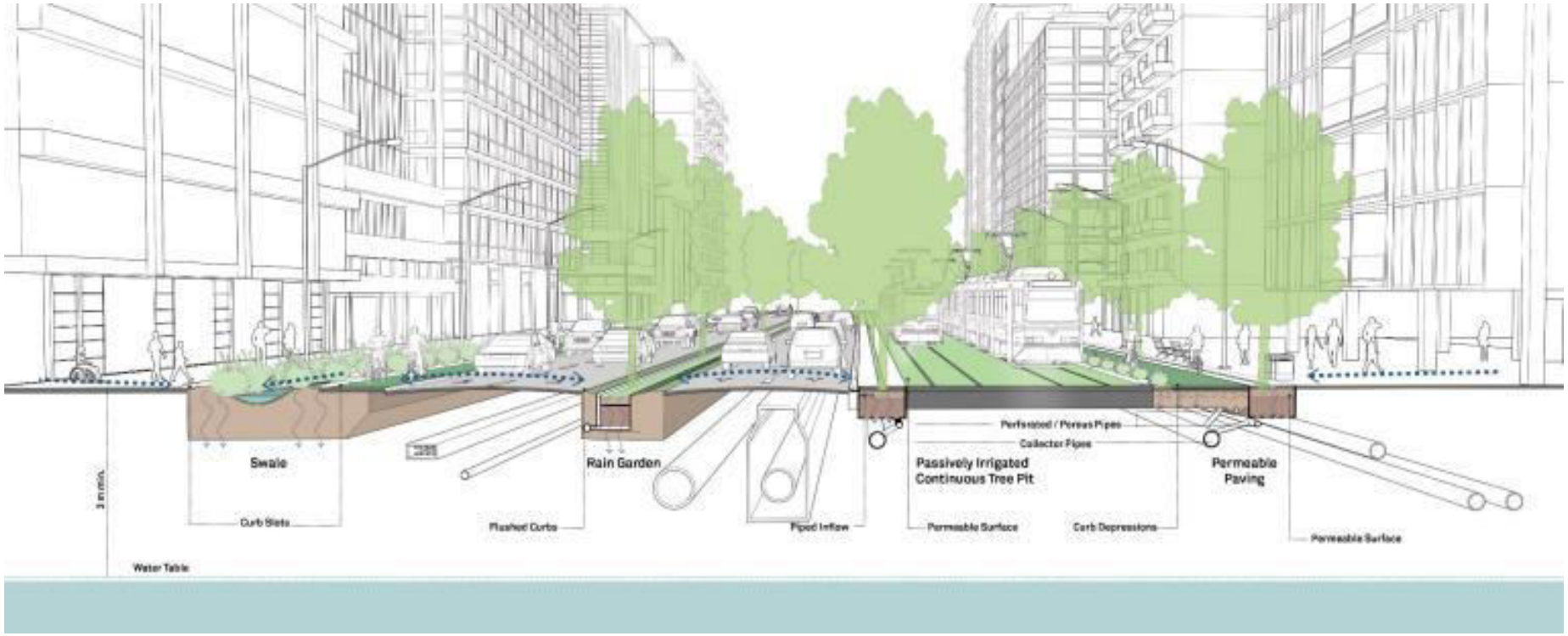
EASTERN STREAM

WESTERN STREAM

DAM EARLY WARNING SYSTEM

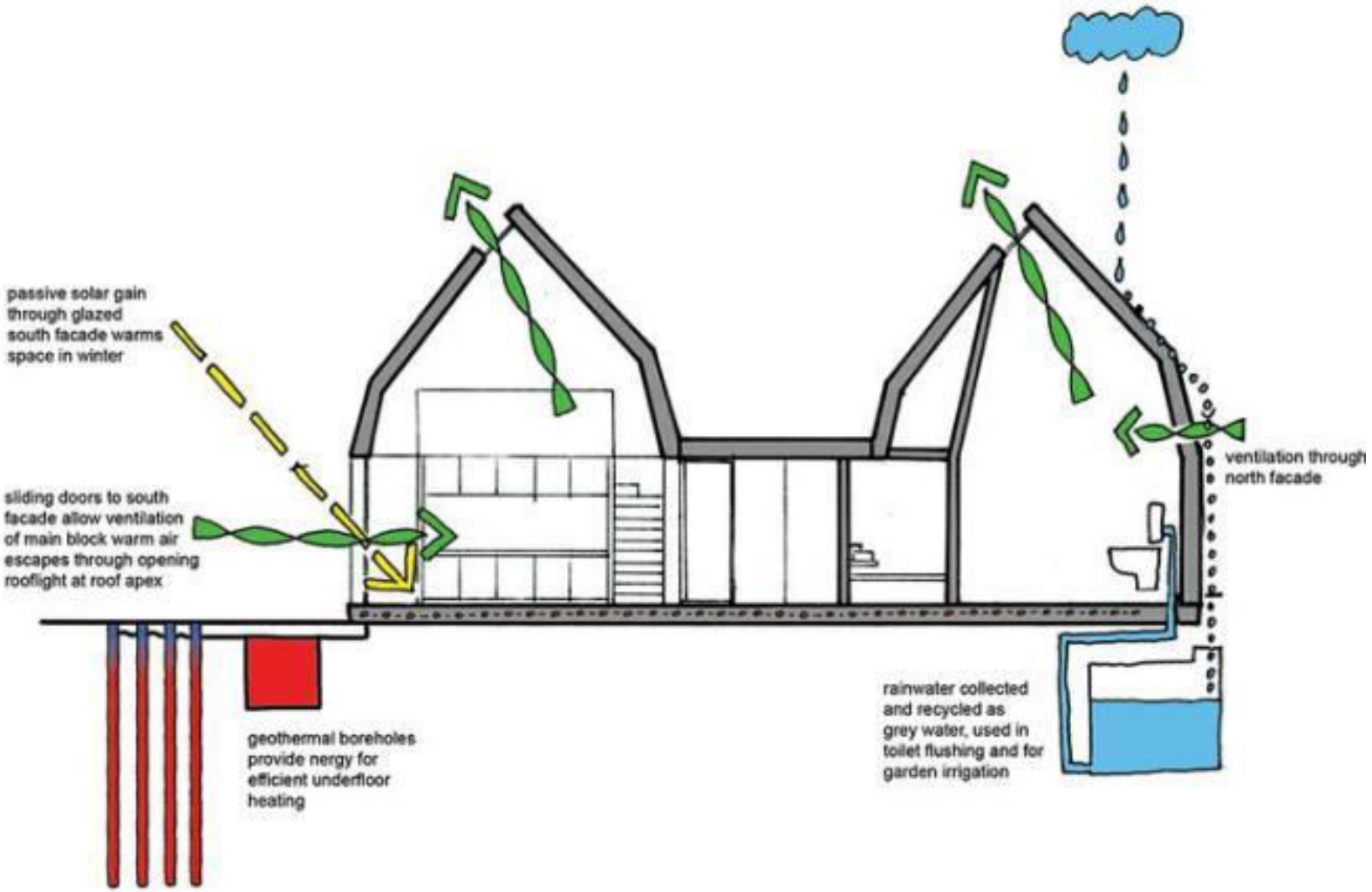
CENTRAL STREAM

Tree pit green drainage

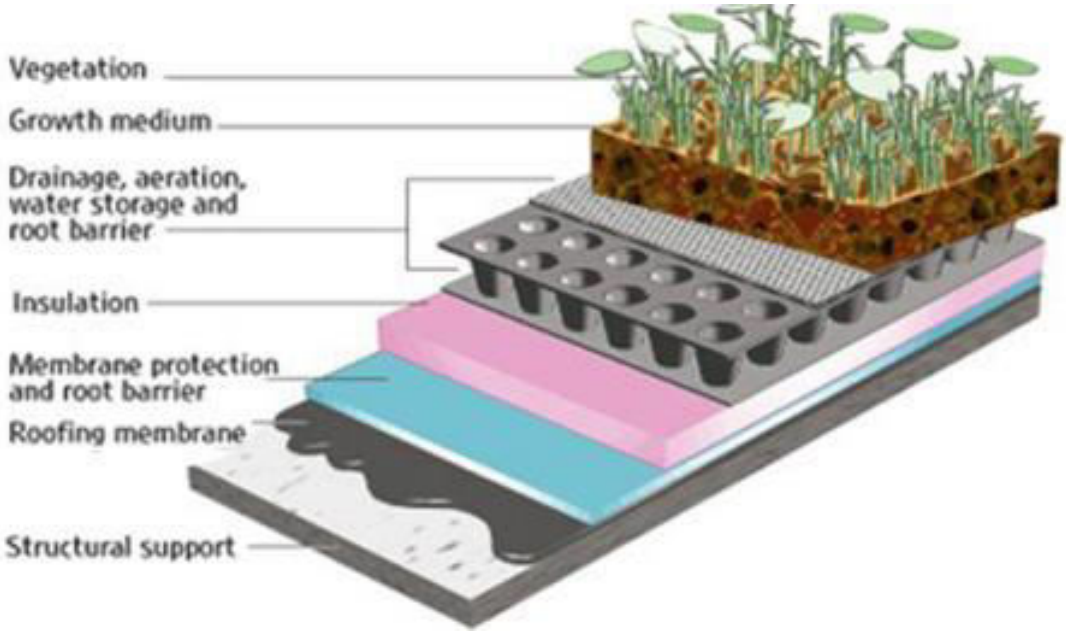


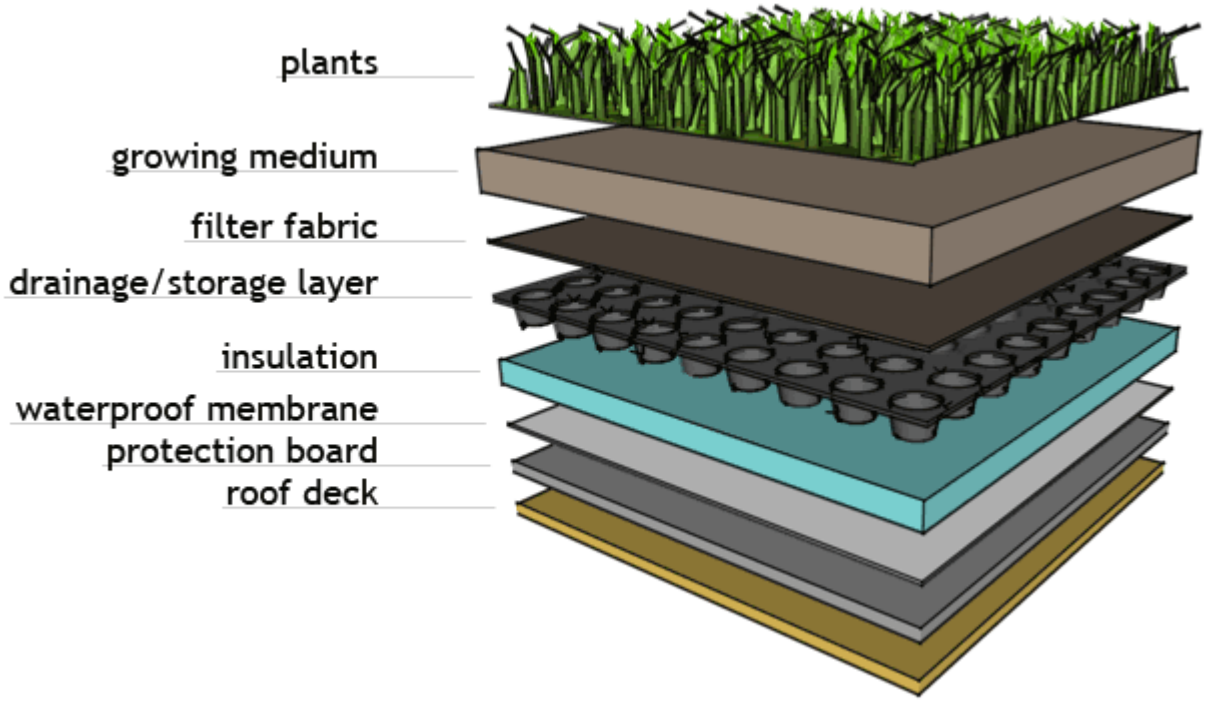
Action Plan	Projects	Mitigation	Adaptation	Stakeholder	Financial Resources	Location	Timeframe
Smart green building and innovative construction	- Applying integrated MEP (Mechanical, Electrical, Plumbing) on public buildings that connects to ICT system. - Applying Environmental friendly construction materials, green roofs, roof top planters, green facades and green walls.	- To reduce 80% operational and maintenance costs. - To save energy use up to 85% by 2025 - To accelarate the evaporation process - To reduce CO2 - To increase 80% of energy efficiency	• Automatic water bank for building. • Using Local material • Recyclable approach for construction materials i.e recycled metal	- State Company (Power company). - Green Building Council Indonesia (GBCI). - Public Works Ministry - Multy Donor Fund - Private Sector Company - Ministry of Environment	The donors covers 40% and the rest belongs to Central and Jakarta Prov Gov 40 % and 20% respectively.	- - 2018-2020 - focus on the building on Medan Merdeka, Jakarta City Hall -- 2020-2025 all the buildings in Jakarta	- Review on the current design Plan : 2018 - Upgrading system : 2019-2021 - Evaluation and Monitoring: 2021-2025 -Review the existing design - Plan : 2018 - Redesign 2019 month)

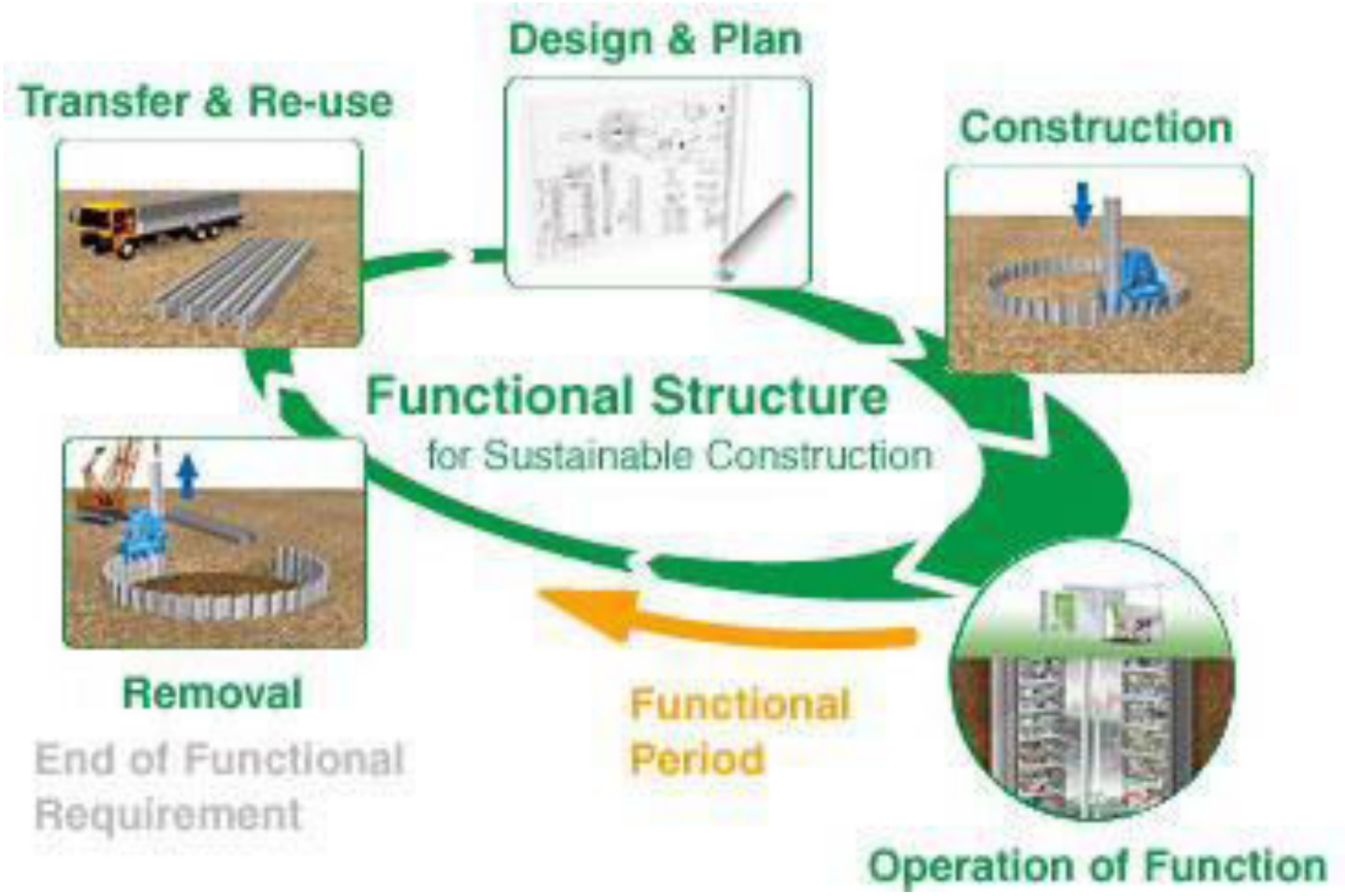
Integrated MEP



Eco Material


Vegetation
Growth medium
Drainage, aeration, water storage and root barrier
Insulation
Membrane protection and root barrier
Roofing membrane
Structural support


plants
growing medium
filter fabric
drainage/storage layer
insulation
waterproof membrane
protection board
roof deck


Design & Plan
Transfer & Re-use
Construction
Functional Structure
for Sustainable Construction
Removal
End of Functional Requirement
Functional Period
Operation of Function

Action Plan	Projects	Mitigation	Adaptation	Stakeholder	Financial Resources	Location	Timeframe
Giant Seawall	A giant dike (32 km length)	0 % Tidal Flood To slow down Land Subsidence 50% by 2025	Multi Benefits To tackle abrasion and storm surge up to 0%	Indonesian government, Ministry Marine and Fisher, Maritime Ministry, the local Jakarta Administration and Private Investors	Joint Venture project	North Coastal Jakarta Area (from the city of Tangerang in the west of Jakarta to Jakarta's Tanjung Priok harbour).	2014 - 2025

GIANT SEA WALL

Action Plan	Projects	Mitigation	Adaptation	Stakeholder	Financial Resources	Location	Timeframe
Compact city and affordable housing development	Creating one data Sustainable urban design innovation Building active transport facilities (cycling, pedestrian routes) Bioclimatic design and construction Redesigning the Land Use and Vulnerable Area Map	To cut 75% bureaucracy line, to generate new behaviors and new social norms (increasing awareness) Contribute to more water storage and availability of water catchment area. To prevent reconstruction and relocation To achive environemental ly friendly building	Smart Water storage system Bioclimatic design Active transport accessibility Vulnerable Zones Map Urban Block Plan	- Public Works, Ministry - Jakarta Prov Gov - International Donors - IAI and IAP	International and national Banks covers 50 per cent and the rest belongs to Central and Jakarta Prov Gov 30 per cent and 20 per cent respectively	Tanjung Barat, Dukuh Atas, Ciracas, Cibubur	EIS: 2018 FS: 2019 Block Plan and DED: 2020 Execution: 2020-2024 Monitoring and Evacuation: 2025

Action Plan	Projects	Mitigation	Adaptation	Stakeholder	Financial Resources	Location	Timeframe
Forest restoration up to 200 per cent by 2025 at upstream region 10 Billion M3 Dam	- Landscape assessment project . - 10 million plantation - Land restoration - Dam Facility on Upstream Ciliwwung River, Bogor	- To reduce water debit contribution from upstream to Jakarta up to 50 % - To reduce emission up to 60 %. -- To reduce water debit cobtribution up to 50% -- To provide electrical power up to 30 MW	- Management Forest system - Supportting drainage system flood	Forestry ministry, environment ministry, local governments, NGOs, Educational and Academician Institutions. Central Giv, Ministry of Public Works, Local Govs, NGOS, Acanmician institutions	Forestry Ministry, Environment Ministry NGO, Jakarta'Neighbor hood local governments.	Bogor	Assessment : 2018 Execution: 2018-2024 Monitoring and Evaluation: 2018-2025 Planning : 2018-2020 Execution: 2020-2025 Monitoring and Evaluation: 2020-2025

Forest Restoration

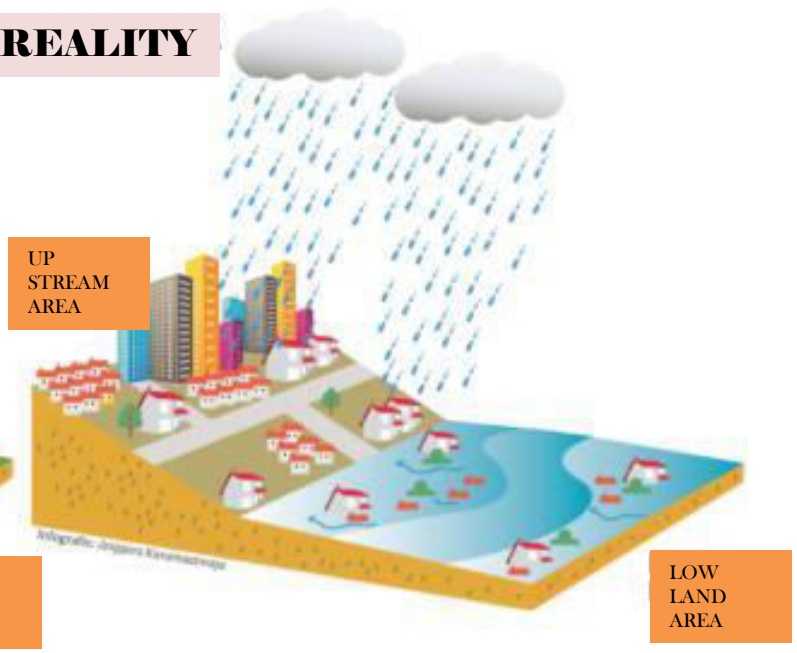
THE EFFECT OF CHANGGING THE LAND USE TO FLOOD DEBIT

IDEAL

Sumber: *Lithang Kompas, diolah dari paparan Jakarta Kota Sungai dalam Perspektif Iklim Lampau, Kini, dan Mendatang*

THE EFFECT OF CHANGGING THE LAND USE TO FLOOD DEBIT

REALITY



Sumber: *Lithang Kompas, diolah dari paparan Jakarta Kota Sungai dalam Perspektif Iklim Lampau, Kini, dan Mendatang*