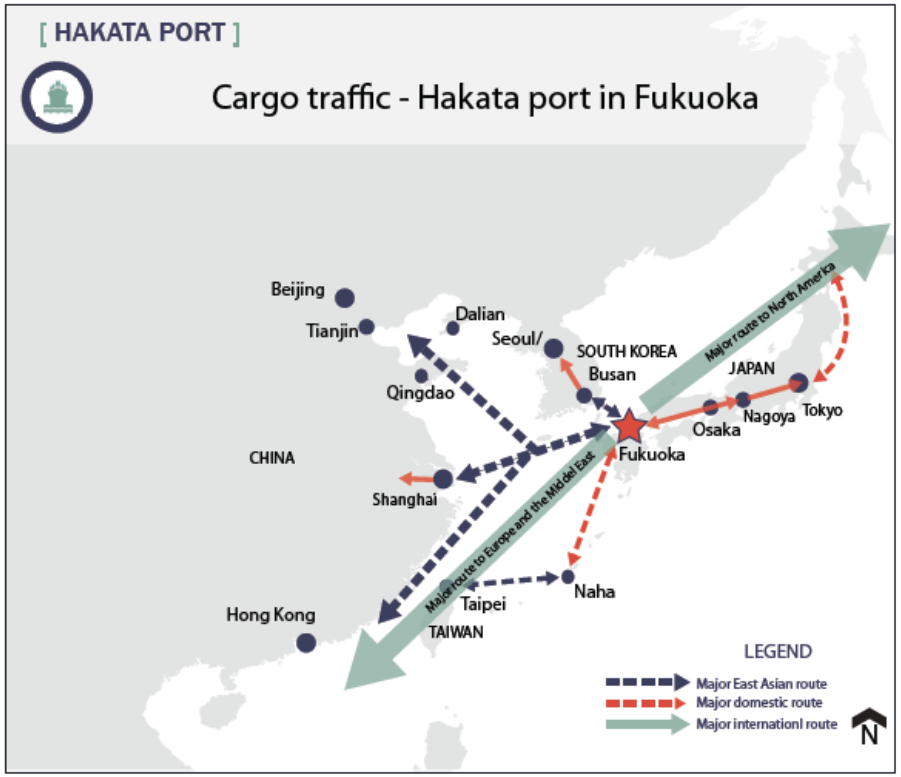
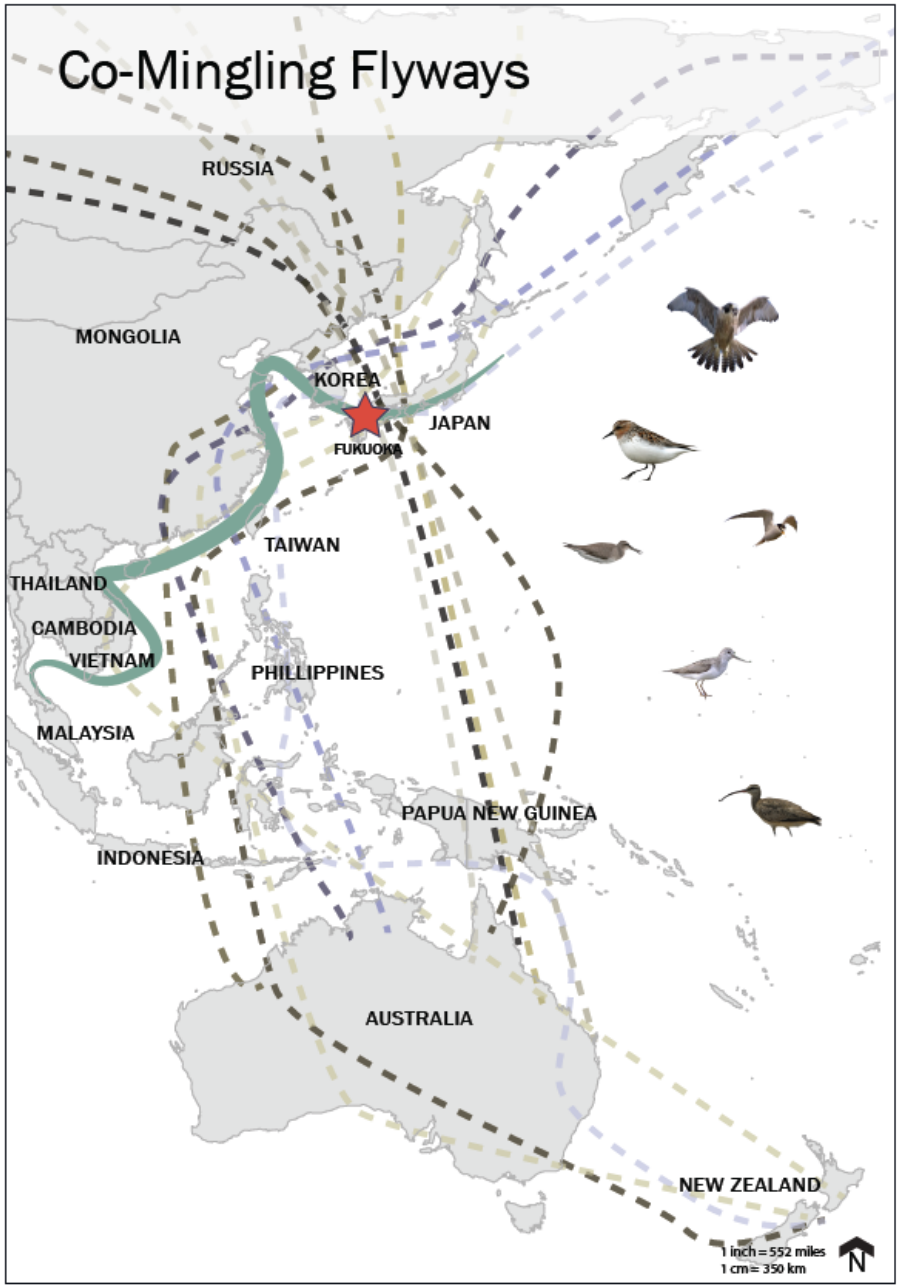
Vibrant habitat:
Co-mingling urban and natural elements of Hakata Bay

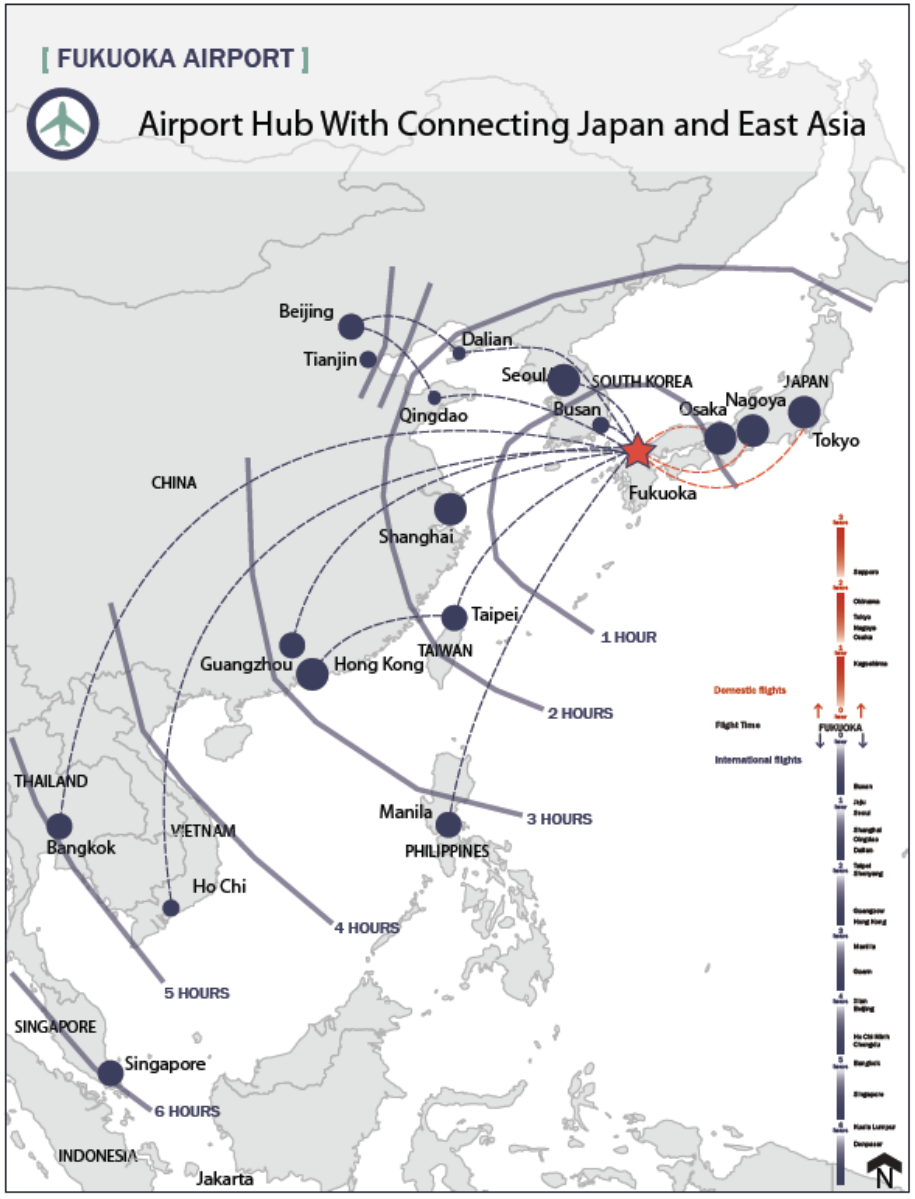
Black-faced Spoonbills
クロツラヘラサギ　저어새

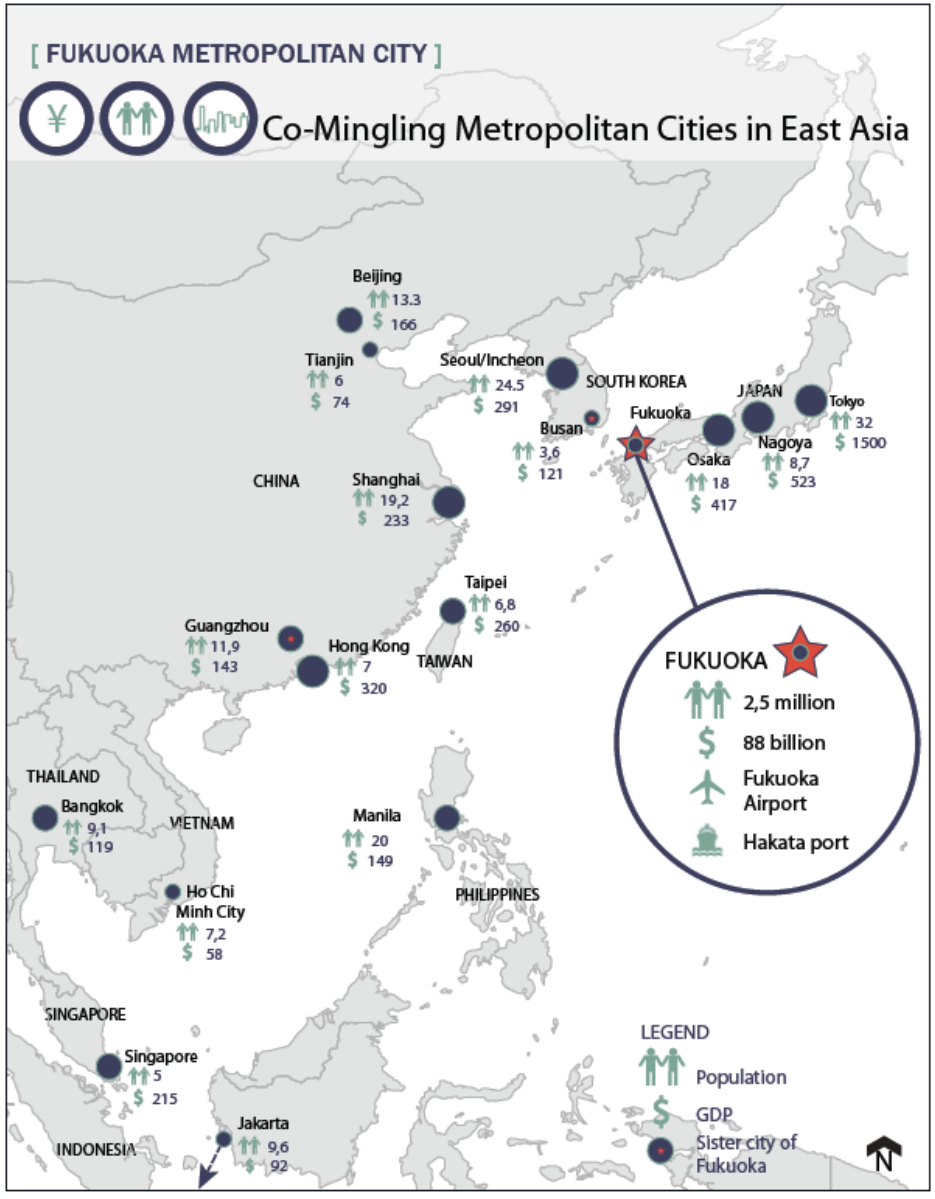
SAVE International
May 16 2011



FUKUOKA IS CENTRALLY LOCATED







FUKUOKA AS A GATEWAY CITY AND HUB

A HUB WITH A UNIQUE IDENTITY GIVES IT A COMPETITIVE EDGE

COMPETING CITIES

STAGNANT.
HOMOGENOUS.
UNIFORM.

POTENTIAL

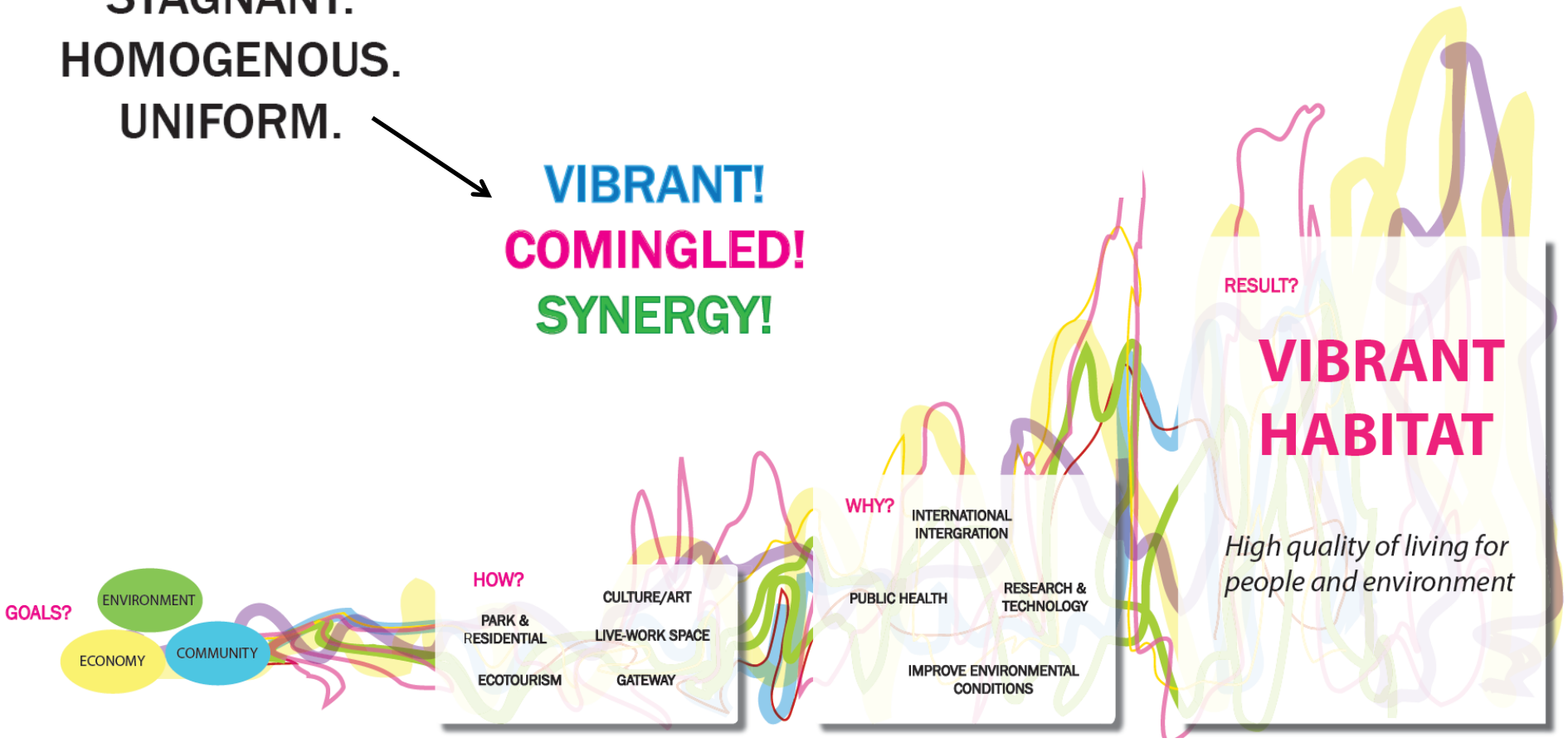
VIBRANT!
COMINGLED!
SYNERGY!

GOALS

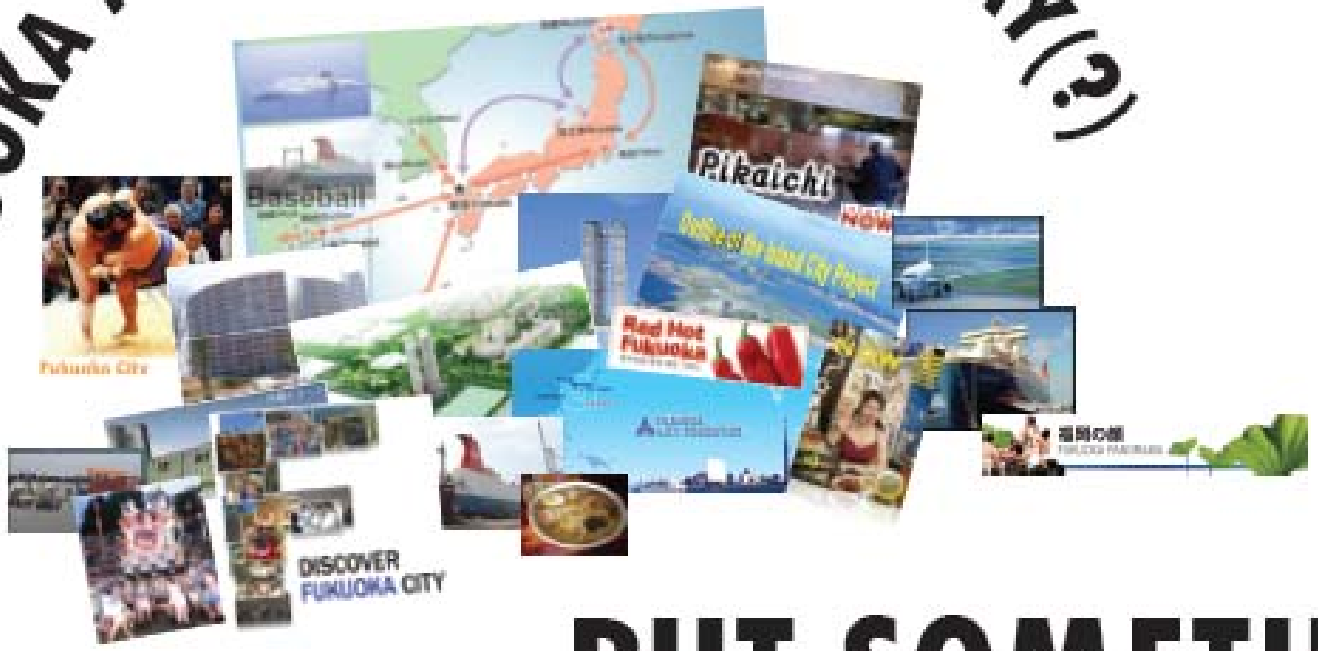
economy
community
environment

STAGNANT.
HOMOGENOUS.
UNIFORM.

VIBRANT!
COMINGLED!
SYNERGY!

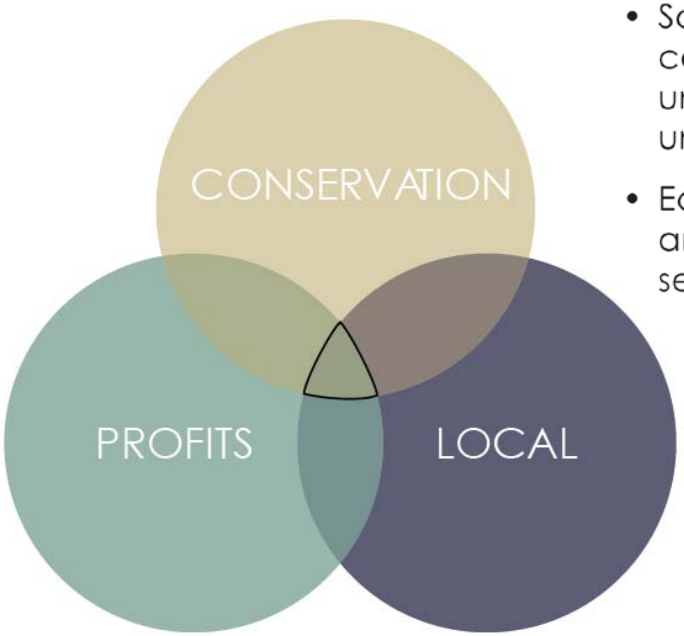


FUKUOKA AS A REGIONAL GATEWAY(?)



BUT SOMETHING IS MISSING!

ECOTOURISM = comingling



- Ecotourism is one of the fastest growing segments of the tourism industry.
- Sophisticated ecotourists come for nature, local culture, unspoiled landscapes, and unique local character.
- Ecotourists come in small groups and stay in one location for several days.

There are specific roles and opportunities for five sectors:

- local citizens
- researchers
- the travel industry
- tourists
- government

"The participation of researchers, government officials, and local people is particularly unique and important for ecotourism development."

FUKUOKA HAS TREMENDOUS ECOTOURISM POTENTIAL

ECOTOURISM POTENTIAL

CHECKLIST ON TOURISM POTENTIAL OF PROTECTED AREAS

(1) Is the protected area
- close to an international airport or major tourist center?
- moderately close?
- remote?

(2) Is the journey to the area
- easy (short) and comfortable?
- a bit of an effort?
- arduous or dangerous?

(3) Does the area offer the following
- "star" species attractions?
- other interesting wildlife?
- representative wildlife?
- distinctive wildlife viewing (on foot, by boat, from hides)?

(4) Is successful wildlife viewing
- guaranteed?
- usual?
- with luck or highly seasonal?

(5) Does the area offer
- several distinct features of interest?
- more than one feature of interest?
- one main feature of interest?

(6) What standards of food and accommodation are offered?
- high standards
- adequate standards
- rough standards

(7) Does the area have additional
- high cultural interest?
- some cultural attractions?
- few cultural attractions?

(8) Is the area:
- unique in its appeal?
- a little bit different?
- similar to other visitor reserves?

(9) Does the area have
- a beach or lakeside recreation facilities?
- river, falls, or swimming pools?
- any other recreation possibilities?

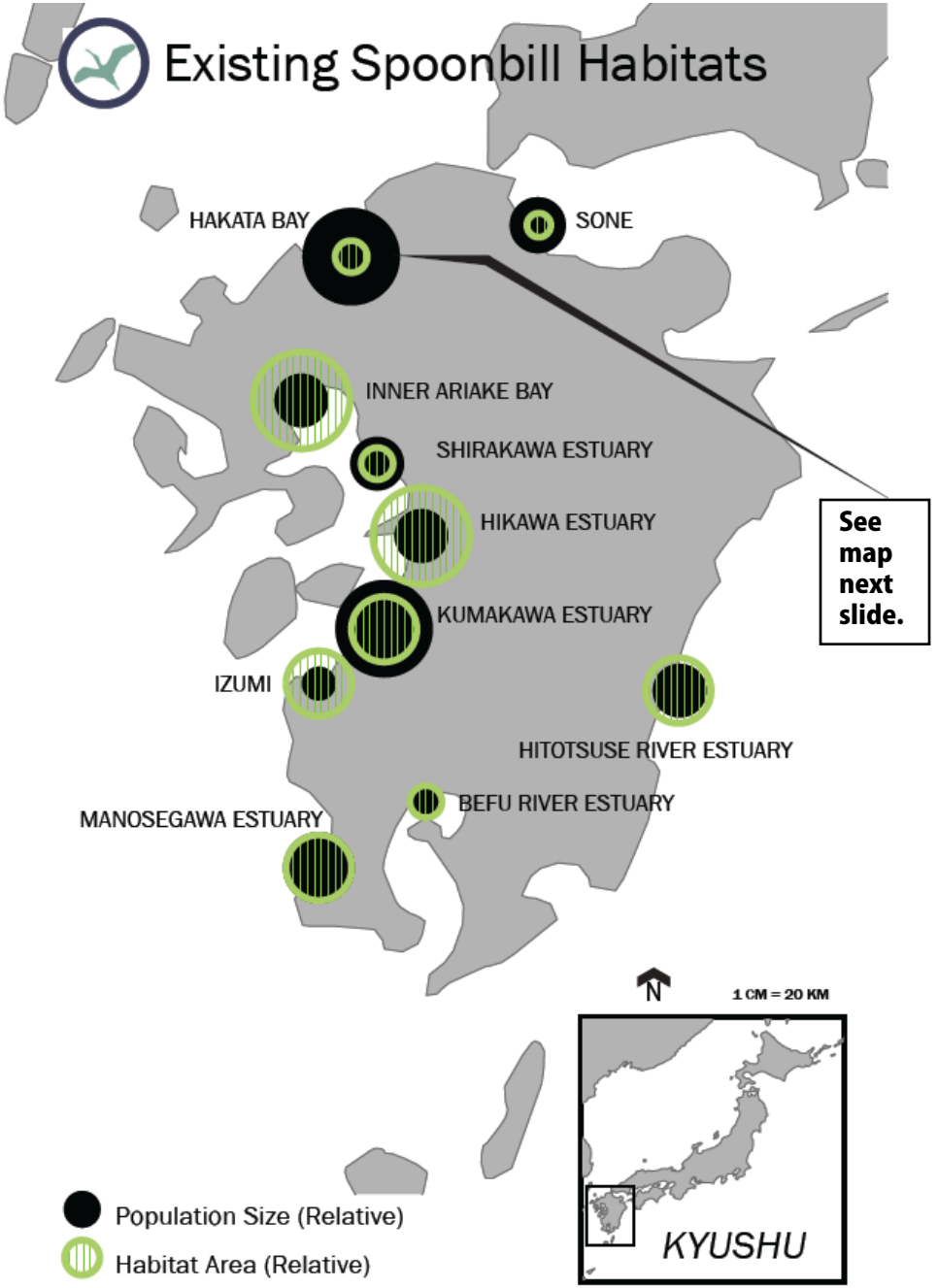
(10) Is the area close enough to other sites of tourist interest to be part of a tourist circuit?
- yes, other attractive sites
- moderate potential
- low or no such potential

(11) Is the surrounding area
- of high scenic beauty or intrinsic interest?
- quite attractive?
- rather ordinary?

(12) Is the cost of the visit
- high?
- moderate?
- low?

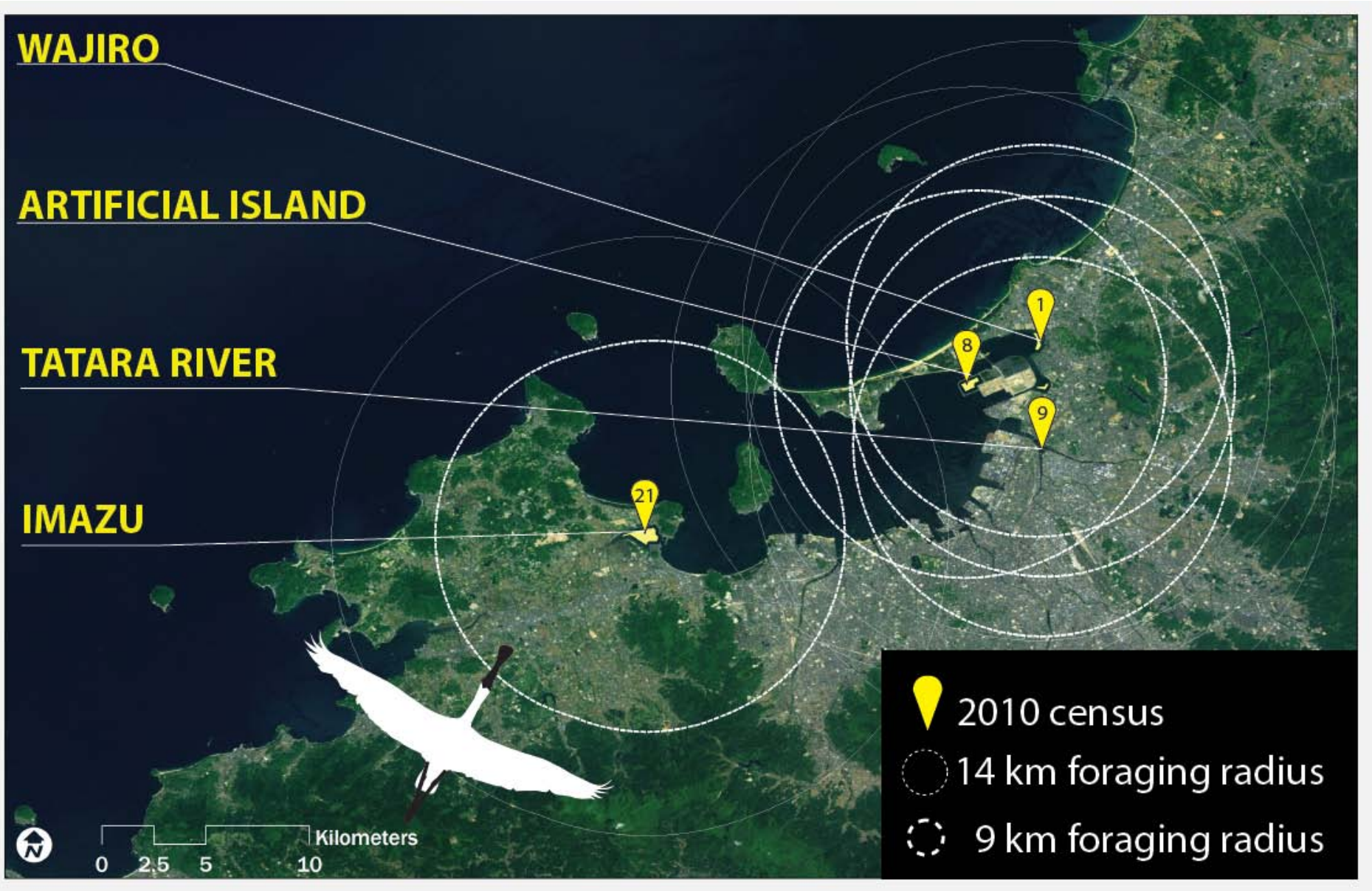
Source: Adapted from McNeely, Thorsell, and Ceballos-Lascurain 1992, p. 17.

Habitat suitability analysis for Kyushu

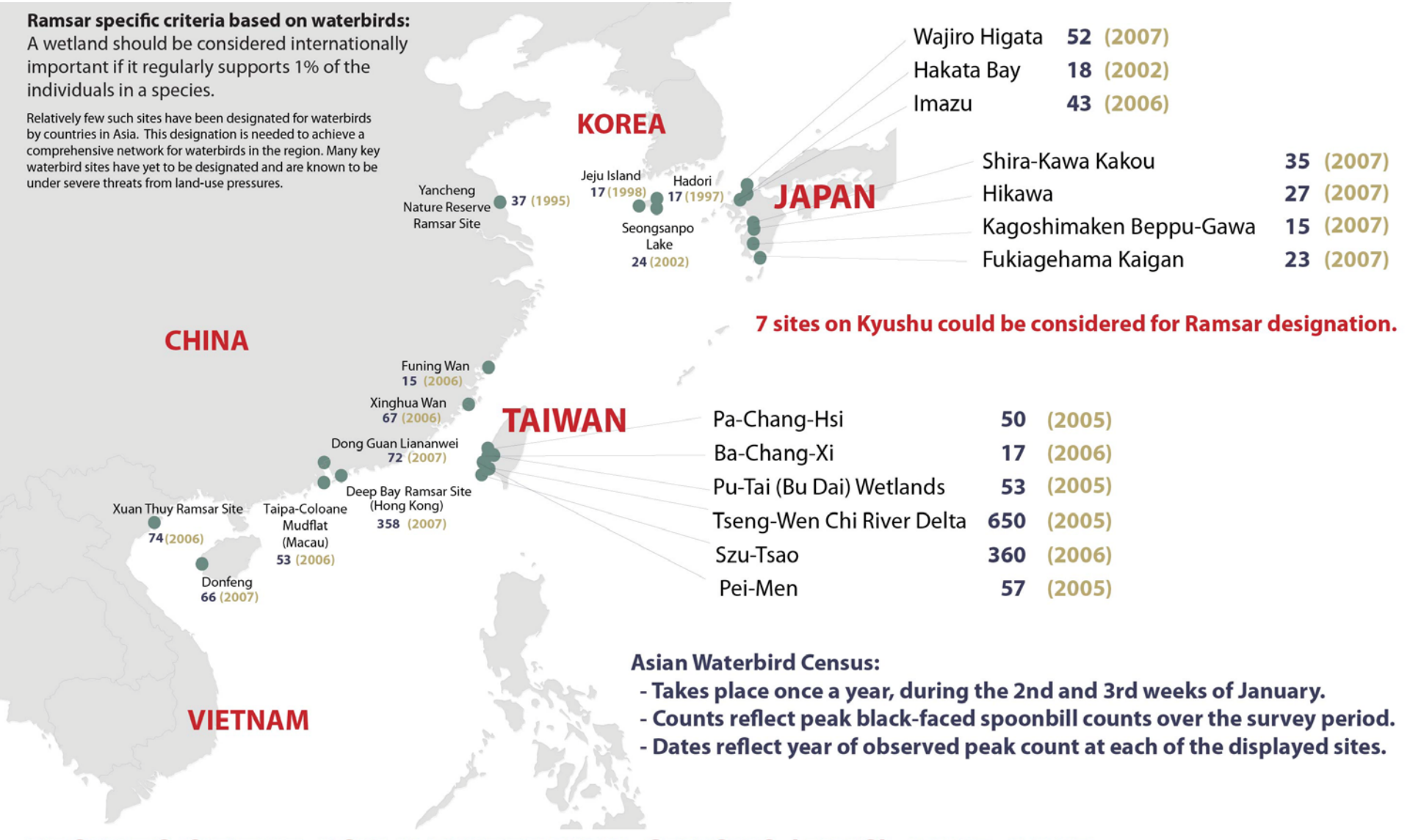


SPOONBILLS IN FUKUOKA

Fukuoka supports a relatively large population given the available habitat it provides.



RESULTS OF THE ASIAN WATERBIRD CENSUS: 1987-2007



Li, Z.W.D., Bloem, A., Delany S., Martakis G. and Quintero J. O. 2009. Status of Waterbirds in Asia - Results of the Asian Waterbird Census: 1987-2007. Wetlands International, Kuala Lumpur, Malaysia

URBAN WILD BIRD PARK PRECEDENTS

Ecological reserves can be successfully incorporated into urban areas.

NAKDONG ESTUARY ECO CENTER

Estuary formalized as a reserve

YEAR 2006

SIZE 269 ha

# of SPECIES 166 species

VISITORS 125,000

GYOTOKU WILDLIFE PRESERVE

Mitigation for development

YEAR 1976

SIZE 83 ha

# of SPECIES *[no data]*

VISITORS *[no data]*

URBAN WILD BIRD PARK PRECEDENTS

Ecological reserves can be successfully incorporated into urban areas.

50+
species of shorebirds

more than
100,000 visitors
a year

one of the most 500 most important wetlands in Japan (#266)

increased education and outreach

bird-watching festivals including a "Bird Week"

TOKYO PORT WILD BIRD PARK

Abandoned fill converted to reserve

YEAR 1978

SIZE 27 ha

# of SPECIES 73 species

VISITORS *[no data]*

URBAN WILD BIRD PARK PRECEDENTS

Ecological reserves can be successfully incorporated into urban areas.

50+
species of shorebirds

more than
100,000 visitors
a year

one of the most 500 most important wetlands in Japan (#266)

increased education and outreach

bird-watching festivals including a "Bird Week"

1941	Initially a reclamation project to expand port facilities
1942 to 1958	Fill halted
	Informal wetland habitat attracted shorebirds
1969	NGOs get involved in preservation
1974 to 1982	19 hectares protected from urban encroachment
1983 to present	Actively managed as a Wild Bird Park
	Extent of mudflat increased to improve habitat for shorebirds
	0.2 ha mudflat increase to 2.6 ha
	Number of birds more than doubled

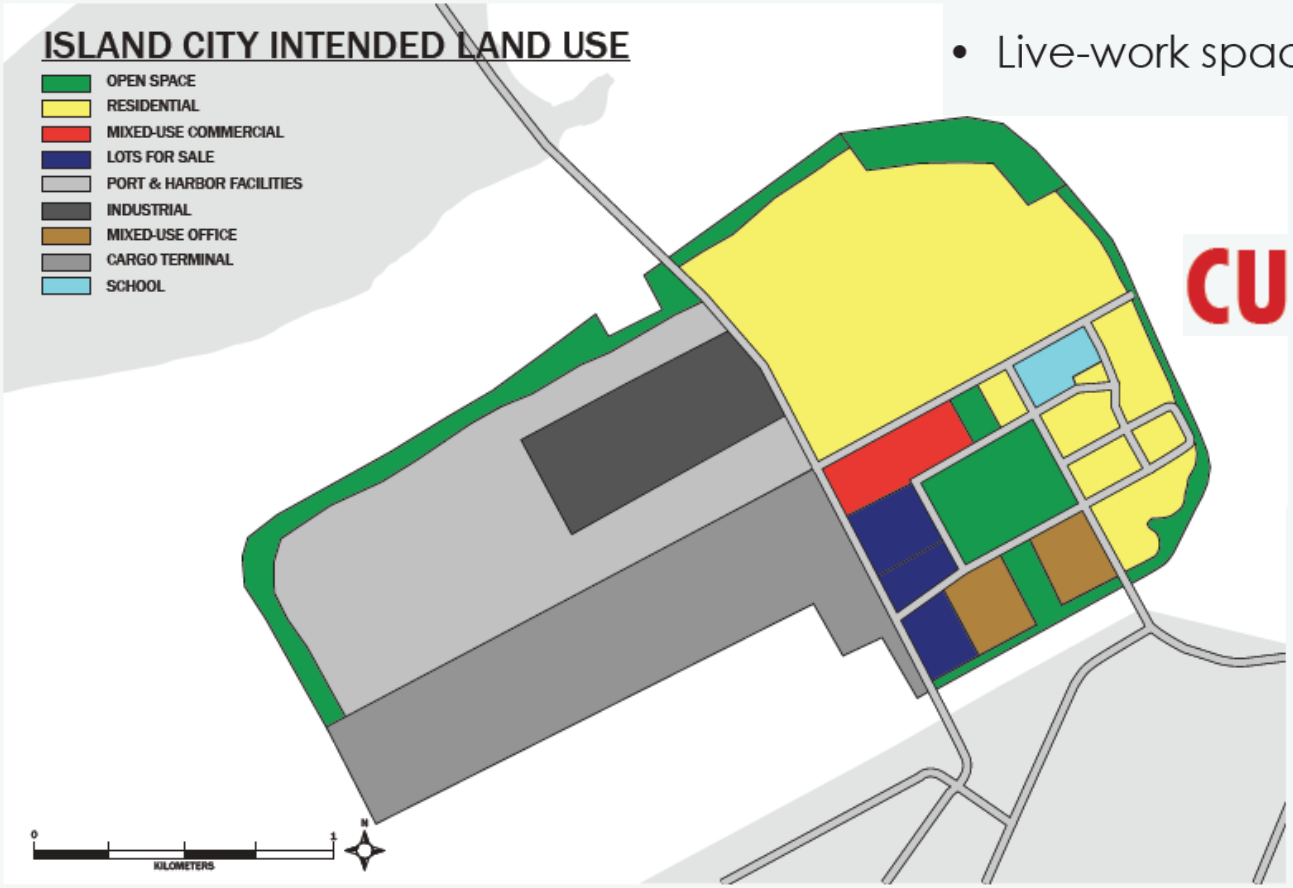
OSAKA NANKO BIRD SANCTUARY

Abandoned fill converted to reserve

YEAR 1983
SIZE 19 ha
# of SPECIES 50+ species
VISITORS 100,000

OPPORTUNITY TO CO-MINGLE LAND USES IN ISLAND CITY

- Habitat for a very special bird that can be used as the cornerstone of Fukuoka's ecotourism industry.
- Vital harbor and port infrastructure.
- Blossoming residential community.
- Network of leisure and recreational opportunities.
- Live-work space.

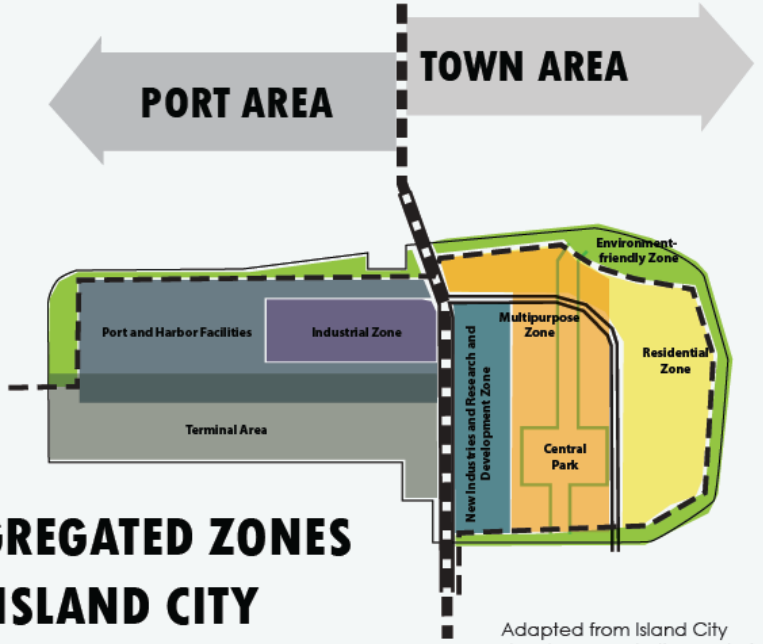


CURRENT PLAN

SEGREGATED AND STAGNANT

FEATURES OF CURRENT ISLAND CITY PLAN

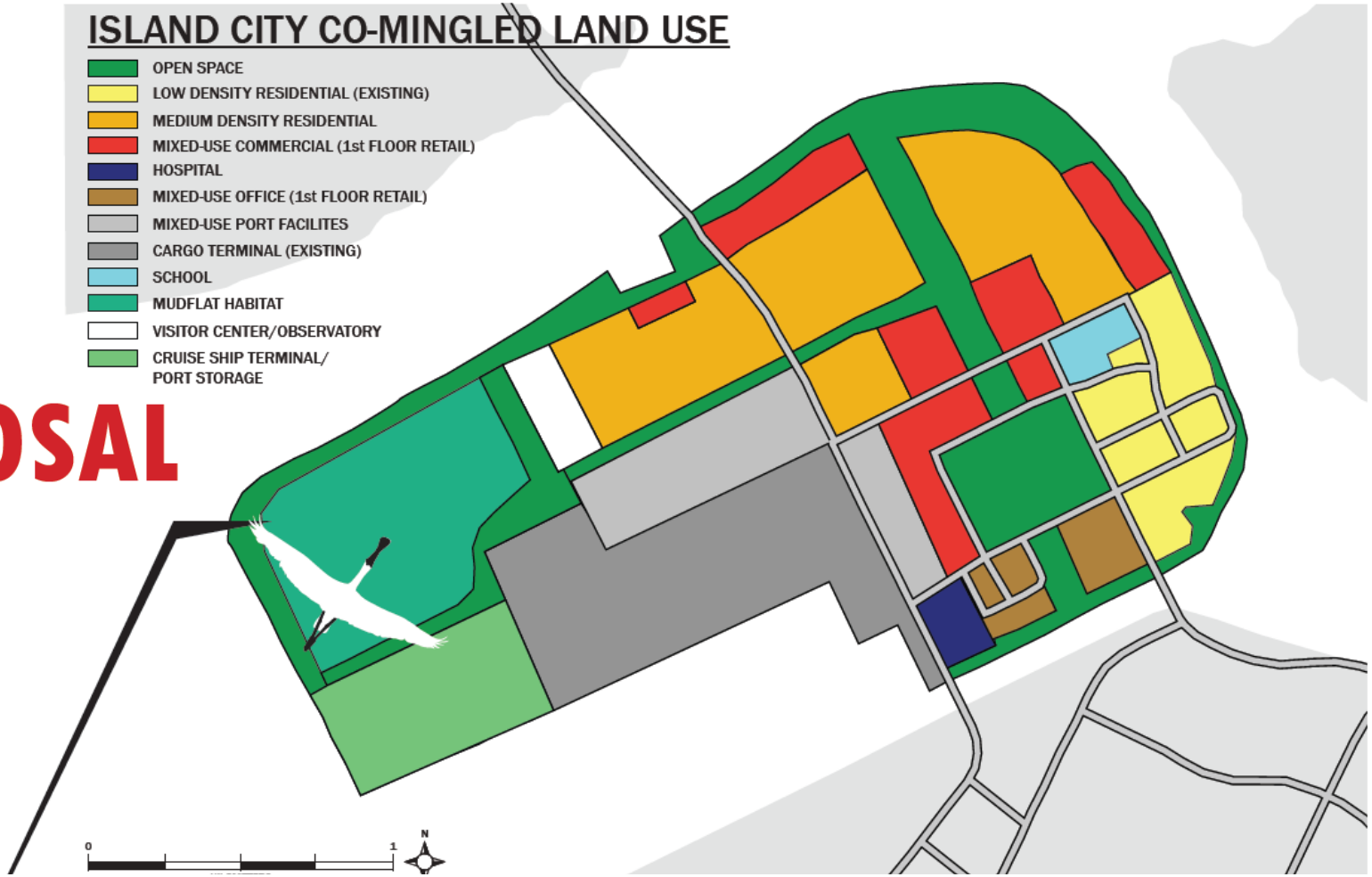
- Proposed wild bird park [12 ha] is **insufficient** to sustain the current population of black-faced spoonbills. *Other habitat in east Hakata Bay has been degraded and almost totally abandoned by black-faced spoonbills.*
- Proposed bird park is situated in an area of the harbor where impaired circulation patterns are likely to produce **harmful anoxic conditions**. *Severe declines in bird popolations have already been observed.*
- Island City was developed with the intent to **segregate land uses** as much as possible. Major road bisects the island.
- Developed under different economic expectations.



SEGREGATED ZONES OF ISLAND CITY

Adapted from Island City developer marketing materials

NEW PROPOSAL



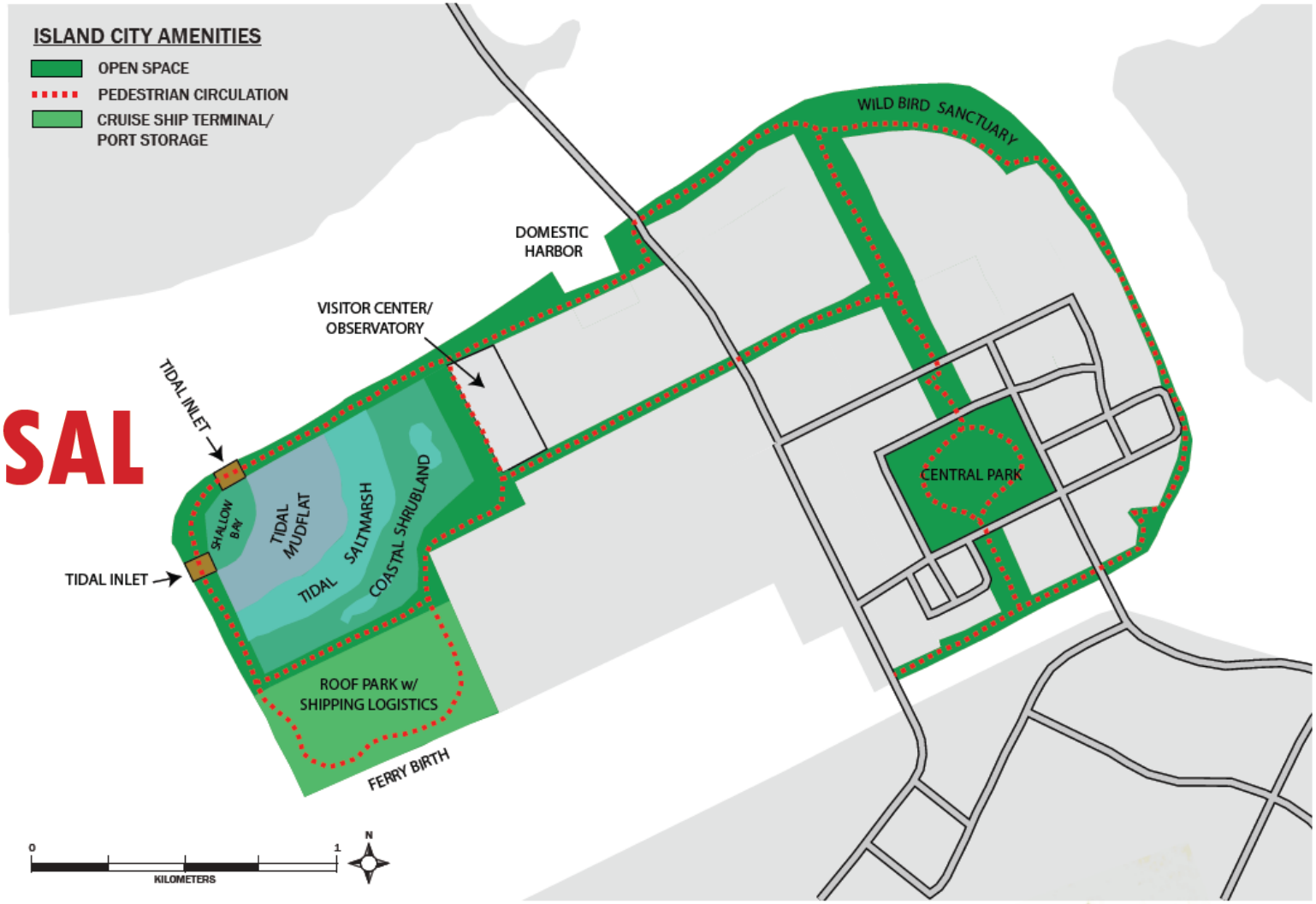
Proposed Wild Bird Park

1. **Compact development frees up space while still retaining the overall density of people and services.**
2. **Land uses are integrated to provide synergy and contribute to a vibrant community.**
3. **A diversified land use and economy increases resilience in the face of economic downturn.**

VIBRANT SUSTAINABLE RESILIENT COMPACT CO-MINGLED INTEGRATED INTERCONNECTED

NEW PROPOSAL

Proposed Wild Bird Park



4. **Adding habitat for the current Island City population and displaced east bay populations (54 ha).**
5. **Bird watching and environmental awareness is integrated into the community, attracting investment and reinforcing the unique image of Fukuoka.**
6. **Public open spaces and pedestrian walkways create cross-area connections.**

VIBRANT SUSTAINABLE RESILIENT COMPACT CO-MINGLED INTEGRATED INTERCONNECTED

NEW URBAN WILD BIRD PARK

PARK ELEMENTS

cargo shipping container [8' x 8' x 40']

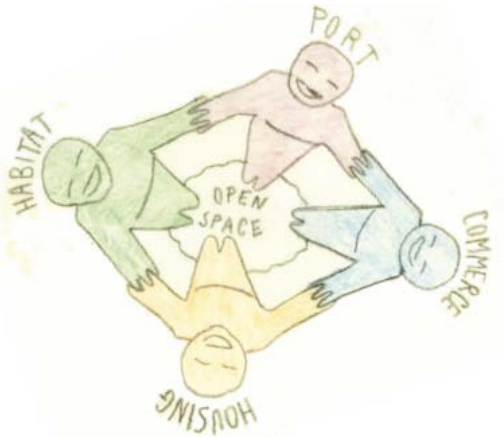
research center

habitat

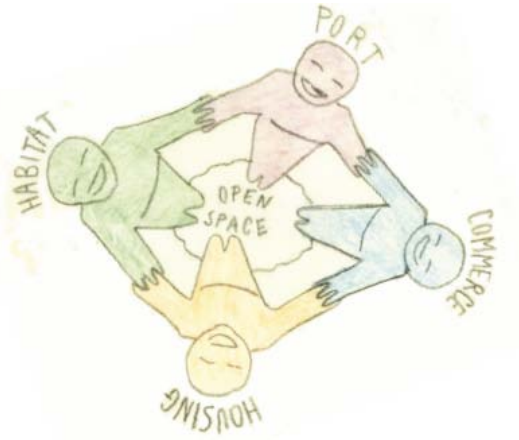
circulation system

urban agriculture

co-mingled village



NEW URBAN WILD BIRD PARK



RESEARCH

MIXED

AWARENESS

HABITAT

SAVE Songdo Tidal Flats:
An Alternative Plan for a Green City

Black-faced Spoonbills

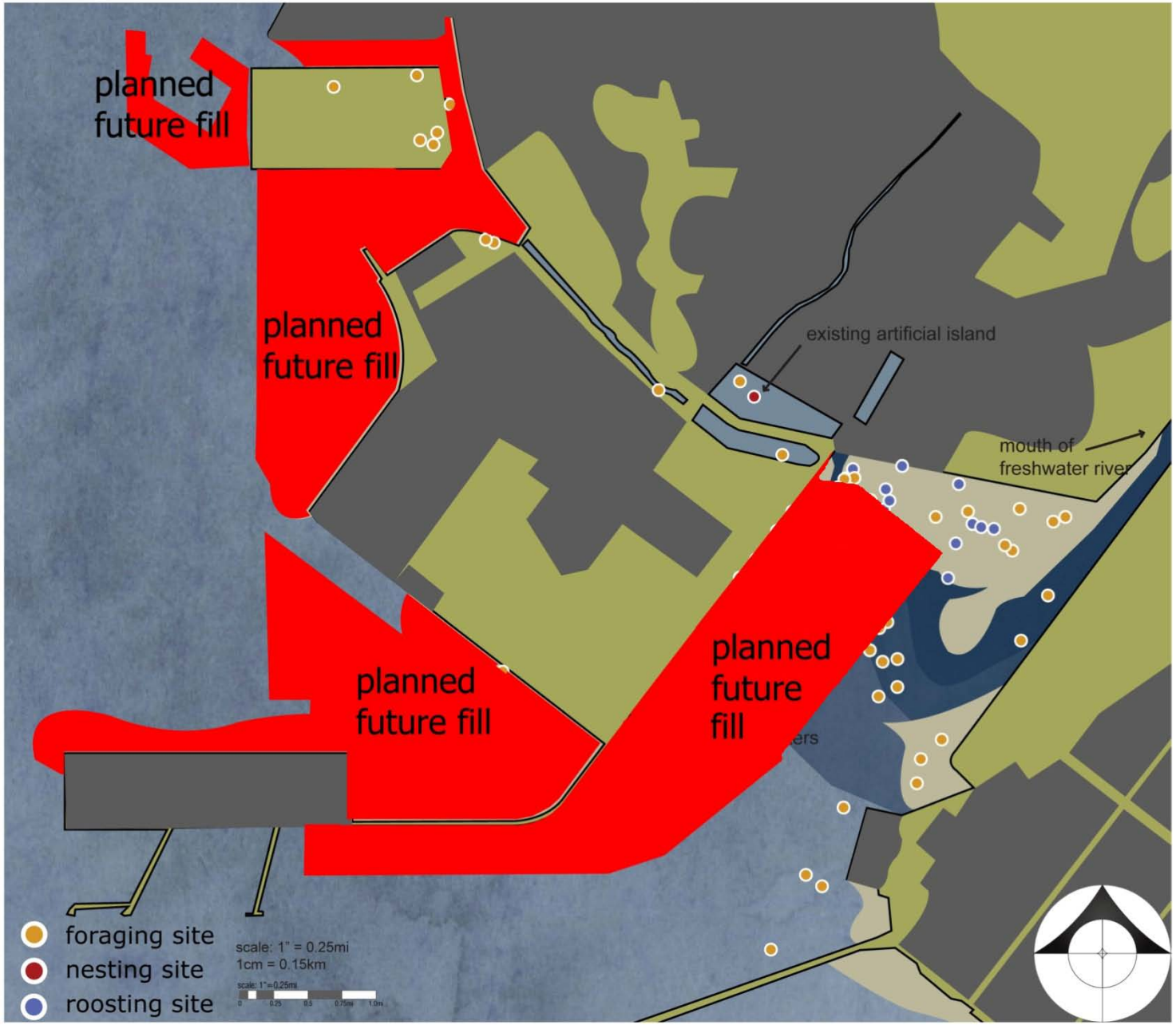
저어새　クロツラヘラサギ

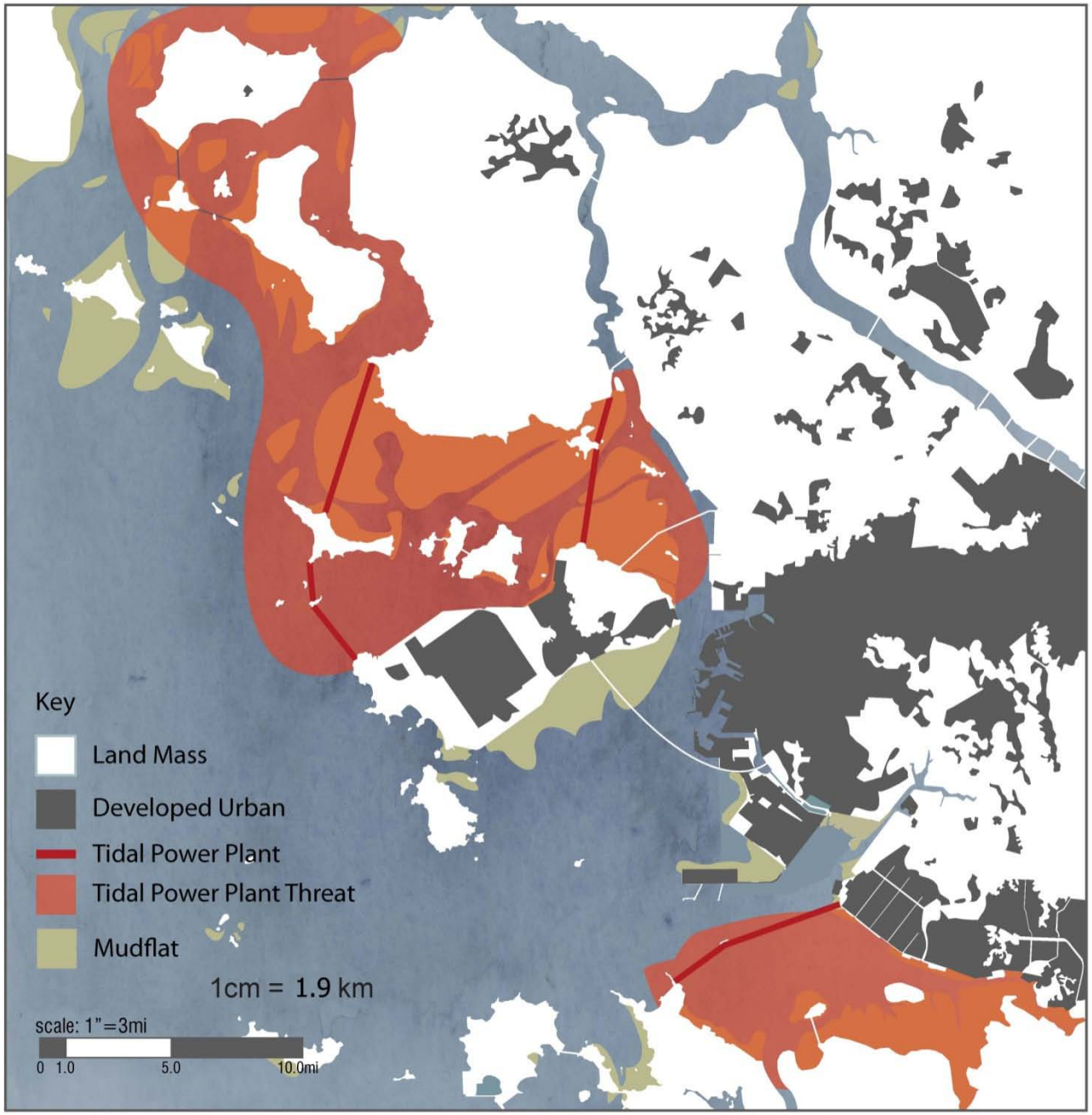
East Asian-
Australian Flyway

Songdo International City

Source: Gale International, 2010

composite spatial behavior analysis


planned
future fill
planned
future fill
existing artificial island
mouth of
freshwater river
planned
future fill
planned
future
fill
foraging site
nesting site
roosting site
scale: 1" = 0.25mi
1cm = 0.15km



regional threats to tidal mudflats

ASSESSING IMPACTS ON MUDFLATS IN SOUTH KOREA

harnessing the tides:
a comparison of the world's tidal power plants

	Basin Area	Coastline Length	# of Houses Powered
A. Russia Kislaya Guba Tidal Power Station Operational Total Capacity (MW): 0.4 Annual Power Generated (GWh): 1.2	1.1 km²	7 km	120
B. China Jiangxi Tidal Power Station Operational Total Capacity (MW): 3.2 Annual Power Generated (GWh): 6.5	1.4 km²	8 km	650
C. Canada Annapolis Royal Generating Station Operational Total Capacity (MW): 18 Annual Power Generated (GWh): 3	15 km²	10 km	3,000
D. France La Rance Tidal Power Station Operational Total Capacity (MW): 240 Annual Power Generated (GWh): 600	22.5 km²	24 km	60,000
E. South Korea Sihwa Lake Tidal Power Station Operational Total Capacity (MW):250 Annual Power Generated (GWh): 553	43 km²	35 km	55,3000
F. South Korea *Gangwhwa Tidal Power Station PROPOSED Total Capacity (MW): 840 Annual Power Generated (GWh): 1,559	79km2	66 km	155,900
G. South Korea *Incheon Tidal Power Station PROPOSED Total Capacity (MW): 1320 Annual Power Generated (GWh): 2,410	156 km2	70 km	241,000

All Basins are at the Same Scale

# of U.S. Houses Powered per Year: 1,000,000 100,000 10,000 1,000 100

JEFFREY FARRINGTON - KELLY JANES - CYNTHIA RIVAS - ZAN RUBIN - RICARDO SOUSA - LAEP UC BERKELEY

Cost of Tidal Power

Process	Change	Summary	Location
Tidal Mixing	↓	• Altered Dissolved Oxygen dynamics[7]	D, H
Tidal Range	↓	• Dramatic Decrease: Severn[5, 11] • Minimal Decrease: Puget Sound[9]	H
Low Tide	↑	• Submergence of all inter-tidal habitat below mean tide level[2] • Loss of inter tidal areas[11]	D, H
Salinity	↓	• Reduce the salinity range due to less mixing with the ocean[2]	A, H
Turbidity	↓	• Turbidity changes[2]	D, H
Productivity	↑	• Decreased turbidity yields higher phytoplankton growth and benefits the food web dependent on phytoplankton. Potential for algal blooms and eutraphication.[6, 3]	C, D, H
Habitat	↓↑	• Mudflats unavailable to foraging birds.[4, 5]	D, H
Deposition/ Erosion	↓↑	• Altered-with regions of erosion, deposition, and changes in grain size.[6]	H
Water Chemistry	Δ	• Because tidal mixing is decreased, runoff into estuary must be improved to maintain current condition.[2] • Produce clearer, calmer waters but the extreme tidal nature of the estuary would be altered.[11]	C, D, H
Migration	↓	• Fish and mammals somewhat blocked depending on turbine design.[10] • Migration of birds change negatively[11]	C, H
Biodiversity	Δ	• local extinctions and population collapses predicted for designated fish.[2, 11]	H

1.Boehlert, G. W., and A. B. Gill (2010), Environmental and Ecological Effects of Ocean Renewable Energy Development: A Current Synthesis, Oceanography, 23(2), 68-81.
2. Charlier, R. H., and C. W. Finkl (2009), Ocean energy: tide and tidal power, Springer Verlag, Berlin.
3. Choi, K. H., S. M. Lee, S. M. Lim, M. Watton, and G. S. Park (2010), Benthic habitat quality change as measured by macrobenthuna community in a tidal flat on the west coast of Korea, Journal of oceanography, 66(3), 307-317.
4. Denny, H., and C. Bellere (2004), Using benthos as a tool for coastal management: The impact of the tidal power station on benthic communities of the Rance basin, Aquatic Ecosystem Health &# 38; Management, 7(1), 69-79.
5. Goss-Custard, J. D., R. M. Warwick, R. Kirby, S. McGrorty, R. T. Clarke, B. Pearson, W. E. Rispin, S. E. A. L. V. D. Durell, and R. J. Rose (1991), Towards Predicting Wading Bird Densities from Predicted Prey Densities in a Post-Barrage Severn Estuary, Journal of Applied Ecology, 28(3), 1004-10
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7. Hakamura, Y., and T. Fujino (2002), Dynamics of dissolved oxygen concentration in the lower reaches of a rivermouth barrage of the Niagara River, Ecology and Civil Engineering, 5(1), 73-84.
8. Parker, D. M. (1993), Environmental implications of tidal power generation, Science, Measurement and Technology, IEE Proceedings A, 140(1), 71-75.
9. Polagye, B., M. Kawase, and P. Malte (2009), In-stream tidal energy potential of Puget Sound, Washington, Proceedings of the Institution of Mechanical Engineers, Part A: Journal of Power and Energy, 223(5), 571-587.
10. TIDMARSH, W. (1954), Assessing the environmental impact of the Annapolis tidal power project= Evaluation de l'impact sur l'environnement du projet marémoteur d'Annapolis, Water Science and Technology, 16(1-2), 307-317.
11. Department of Energy and Climate Change (2010), Severn Tidal Power: Feasibility study conclusions and Summary Report.

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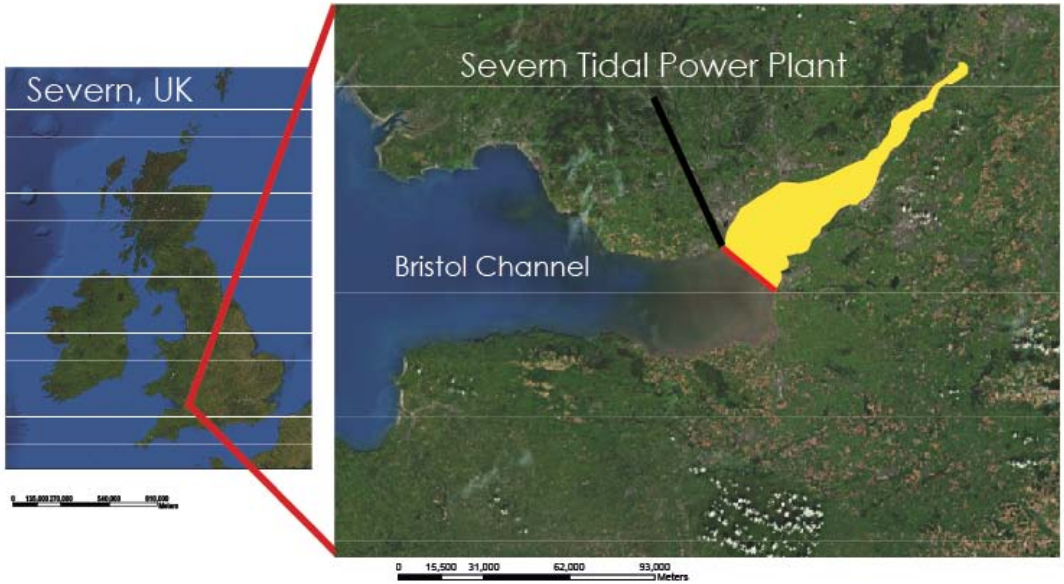
ASSESSING IMPACTS ON MUDFLATS IN SOUTH KOREA



Positive Gain	Negative Cost ($$$)
•Create short term construction jobs •Stimulate the economy through tourism	•Flood risk, resulting in the creation of levees or other systems •Inclusion of a lack and dredging navigation channels •Displace 60% of port activity •Increase original cost of energy to compensate building cost

1.Boehlert, G. W., and A. B. Gill (2010), Environmental and Ecological Effects of Ocean Renewable Energy Development: A Current Synthesis, Oceanography, 23(2), 68-81.

2. Charlier, R. H., and C. W. Finkl (2009), Ocean energy: tide and tidal power, Springer Verlag, Berlin.

3. Choi, K. H., S. M. Lee, S. M. Lim, M. Walton, and G. S. Park (2010), Benthic habitat quality change as measured by macroinfauna community in a tidal flat on the west coast of Korea, Journal of oceanography, 66(3), 307-317.

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9. Polagye, B., M. Kawase, and P. Malte (2009), In-stream tidal energy potential of Puget Sound, Washington, Proceedings of the Institution of Mechanical Engineers, Part A: Journal of Power and Energy, 223(5), 571-587.

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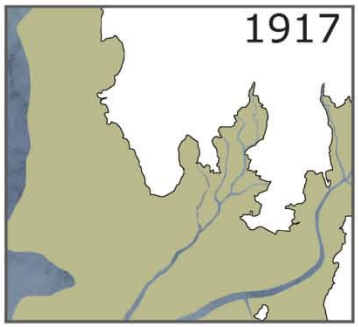
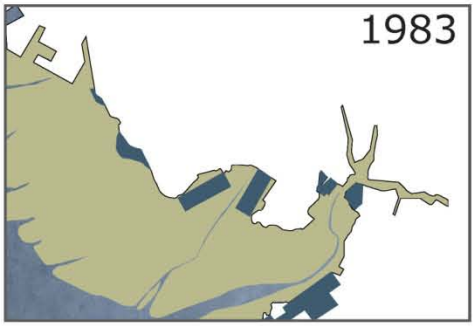
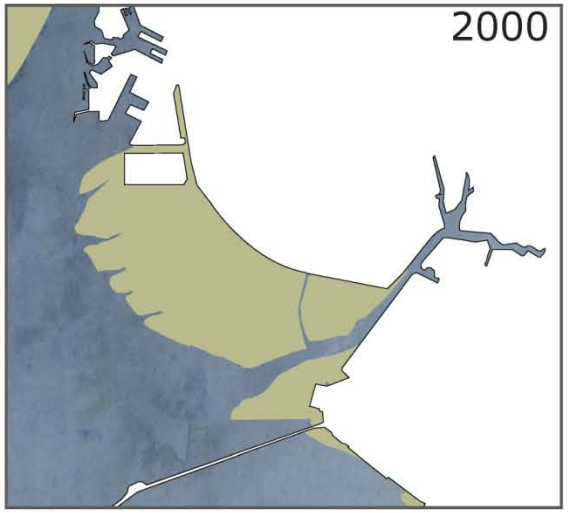
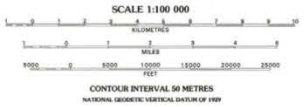
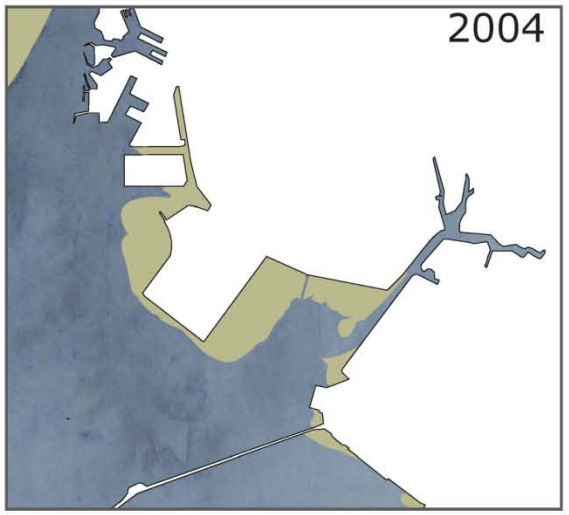


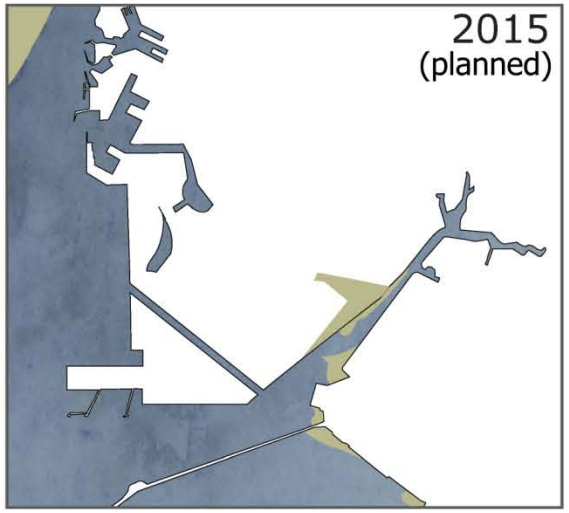




shoreline change







current master plan

current master plan with overlay of BFS behaviors

alternative master plan

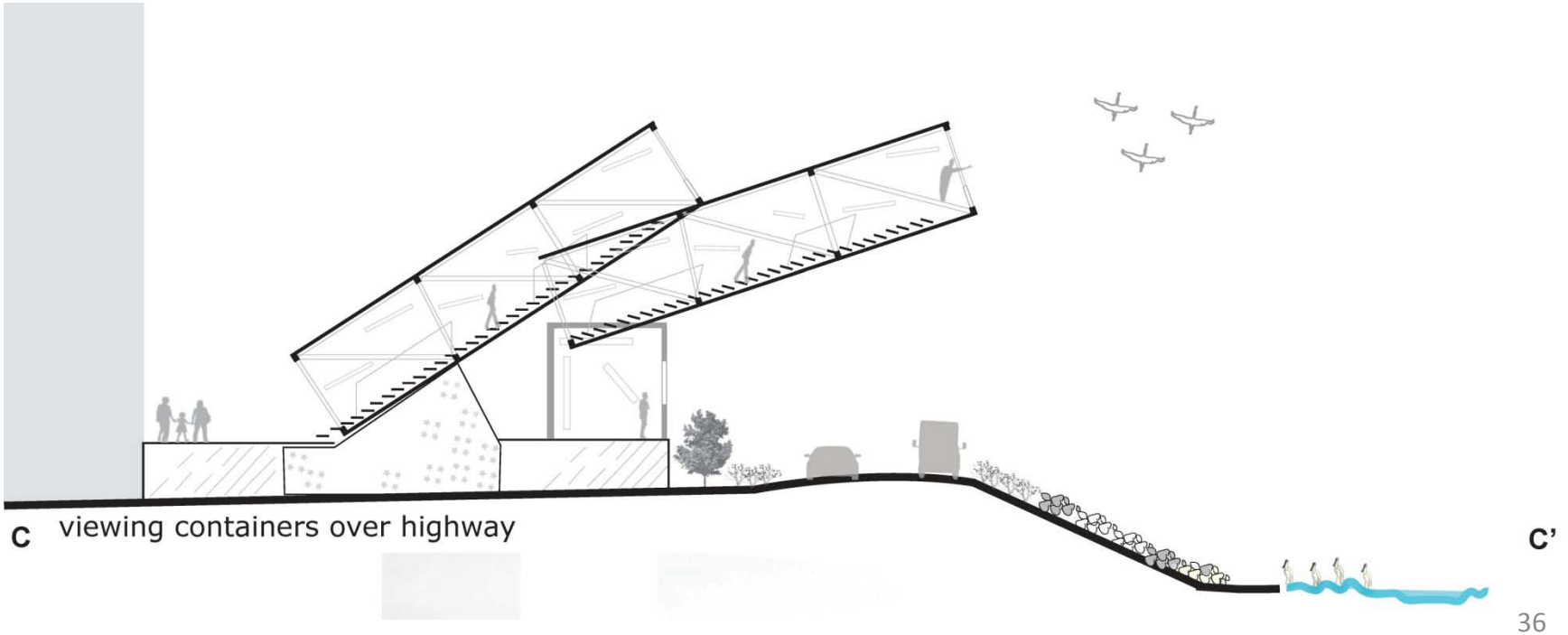
alternative master plan with overlay of BFS behaviors

Alternative Master Plan:
Ecotourism

bird viewing containers along tidal flat greenway

OceanScope by Korean designers Keehyun Ahn & Minsoo Lee is an observatory made of shipping containers in Songdo New City, Incheon, South Korea. *OceanScope* is an initiative from the Mayor of Incheon City, which has one of the biggest ports in Korea. *OceanScope* aims to find unused containers' potential of practical re-use for public space and to provide the bleak containers with new functional aesthetics that can be assimilated within rural landscapes. These viewing containers serve a practical design element extending over tidal flats as bird observatories to enjoy foraging and nesting behaviors of the Black-faced Spoonbill during the summer months of their migration.

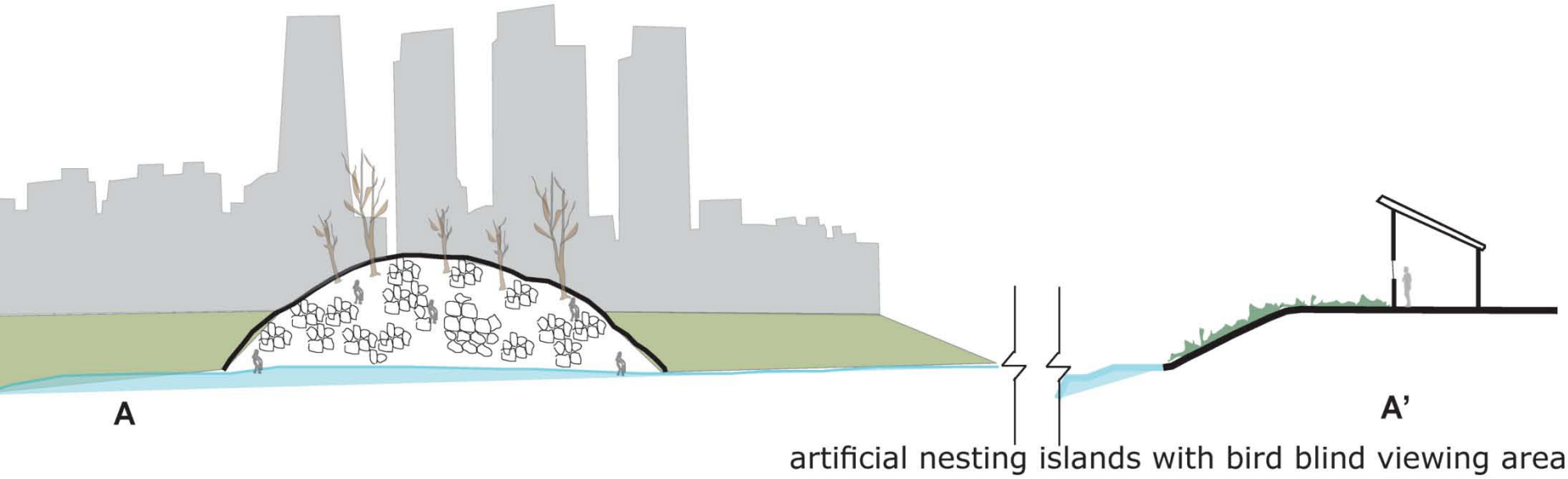
Alternative Master Plan:
Ecotourism



Alternative Master Plan:
Education

educational wetland laboratory

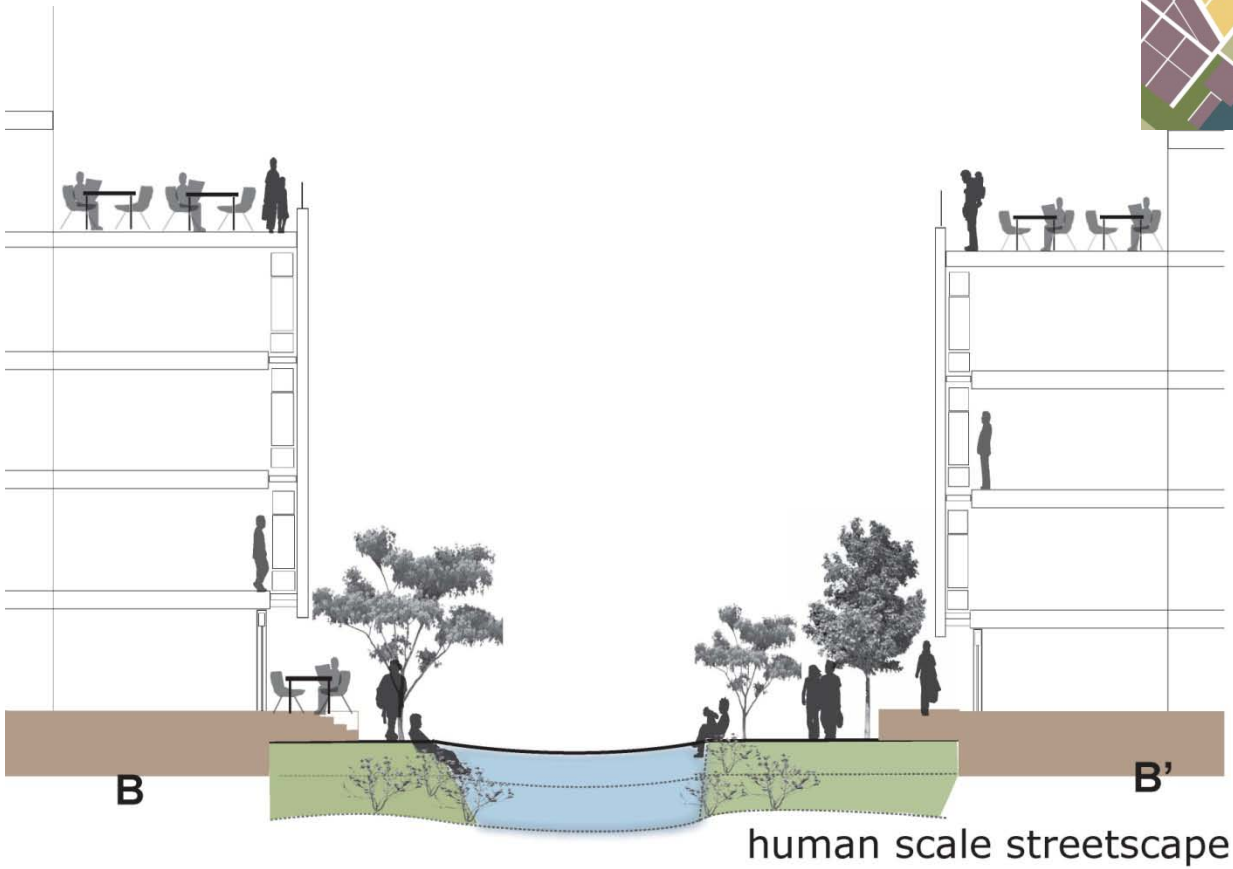
Alternative Master Plan:
Education



Alternative Master Plan:
Improved Quality of Life

tidal pulse greenspace within mixed-use development

Alternative Master Plan:
Improved Quality of Life



human scale streetscape

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THANK YOU!