Capacity building for river basin water resource planning – TA 7629
Mapping progress report

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1 Context

The project “Capacity building for river basin water resource planning – TA 7629” aiming at i) supporting the predation of the amended Law on Water Resources and ii) planning task for the development of water resources of the Red-Thai Binh river basin. The work under the 2nd component will address the whole river basin, sub-basins, provincial area, river segments, regional economic development areas, and main ground water areas. The specific task of the planning task is to identify main issue, water resources functions, assess current water demands, agreed priorities and general solution needs as a basis for developing a river basin water resources plan.

The task of the Maps and Graphics expert is assisting TA 7629 to produce map and graphics required for the workshop and reports; and produce a data table in either Access or Excel that organize water resources data and informaton used in this project.

2 Data used

Indicator data

Data require for the indicator table was described by the International expert on water resources (need Des full name). Totally there are 81 indicators that cover following themes: surface water (19), ground water (9), economic (12), social (13), environment (12) and management (16). Full list of indicators was presented in Appendix 1.

Indicators data was collected and calculated by each team member and then provided to the Mapping expert to organized and used as input to produce map and graphic. Generally the data related to water resources is derived from official data and research from the water sectors. Social data was sources from General Statistic Office and provincial statistic. Data on economic and management were collected at provincial level and then aggregated to sub-basin and basin level. Data on land use/ land cover was collected from General Department of Land Administration (GDLA) under MONRE and forestry data collected from MARD. The detail on data source and calculation is documented in the report of each expert.

In the final data table that combines data for all indicators, there are metadata that describe the source, the time, spatial scale and author/owner of the data.

Non-indicator data and maps

To produce the maps of the Red – Thai Binh river basin a number of data set and base map were collected, this include the administration boundary, location of major town and city, river, road, basin and sub-basin boundary, elevation, slope. These data sources were summarized in Table 1

Table 1. Data and map used to produce based map and none-indicators map

Data set	Source	Scale
Vietnam administrative boundary	MONRE 2010	1/1.000.000
Population density	GSO 2010	1/1.000.000
River and Water body	Vietnam digital Atlas (MONRE 2005)	
Elevation	Global SRTM Elevation dataset by NASA	1/1.000.000
Slope	Derived from global SRTM	1/1.000.000
Land use map	General Department of Land Administration	1/1.000.000
Boundary of the basin and sub-basin	Institute of	

3 Map produced

Following maps have been produced and presented in appendix 2:

- Base map of the basin: base map with China, base map without China
- Indicator maps: Water resources indicator maps, Ground water indicator map, surface water indicator map
- None-indicator map: elevation, slope, land cover, population density.

These maps were under several round of comments and will have some more adjustments toward the end of the project.

4 Appendix

4.1 Appendix 1 – List of indicators

Index #	*Index Name*	*Definition of index*
WRI-1	Sub-Basin water index	The total average annual discharge of the sub-basins as a proportion of the total Basin water volume, including water from any other country. (a) Total incl international component (b) Within VN only
WRI-2	Water productivity index for Sub-Basins	Water volume of sub-basin divided by the sub-basin area
WRI-3	Sub-basin international dependency water index	Proportion of the annual water resources volume of the sub-basin that comes from another country
WRI-4	Sub-Badin International water contribution index	Proportion of the water resources of a sub basin that flows into another country
WRI-5	Dry season international flow index	Proportion of the dry season water resources volume of the sub-basin that (a) comes from another country or (b) flows to another country
WRI-6	Infrastructure inter sub-basin diversion index (Dry season????)	The water diverted between this sub-basin and other sub-basins as a % of the total available water in this sub-basin
WRI-7	Dry season water index for the Sub-Basin	Dry season water resources volume of sub-basin divided by the total water of the sub-basin & No. months of dry season
WRI-8	Water availability index for Sub-Basin	Total annual water resources volume of sub-basin divided by: (a) current population (VN only); (b) projected population at 2025 (VN only)
WRI-9	Dry season water availability index for Sub-Basin	Dry season water resource volume of sub-basin divided by: (a) current population (VN only); (b) projected population at 2025 (VN only)
WRI-10	Water exploitation index (WEI) for Sub-Basin	Proportion of the total annual water resources volume that is exploited and used under: (a) current levels of water demand/use; (b) projected 2015 levels of water demand/use
WRI-11	Dry season water exploitation index for Sub-Basin	Proportion of the dry season water resources volume that is exploited and used under: (a) current dry season levels of water demand/use; (b) projected 2015 dry season levels of water demand/use
WRI-12	Water exploitation per capita index for Sub-Basin	(a) Current total water demands/use of sub-basin divided by current population (VN only); (b) Projected 2025 total water demands/use of sub-basin divided byprojected population at 2025 (VN only)
WRI-13	Sector Water use index for Sub-Basin	Proportion of total water use by the major sectors - irrigations (Ir), agriculture (A), industry (I), urban (U), aquacultre (Aq)

WRI-14	Water storage share index for Sub-Basin	Total active reservoir volume in sub-basin as proportion of total active reservoir volume in the RR Basin, both (a) currently and (b) for 2025.
WRI-15	Water storage control index for Sub-Basin	Total active reservoir volume in sub-basin divided by total water volume for sub-basin
WRI-16	Water storage purpose index for Sub-Basin	Proportion of total reservoir active volumes in the sub-basin used for hydropower, irrigation and flood mitigation
WRI-17	Flood Mitigation storage index for Sub-Basin	Total reservoir storage volume in the sub-basin used for flood mitigation compared to wet season water volume in sub-basin
WRI-18	Climate change - drought areas for Sub-Basin	The percentage change in the areas declared as drought affected under current conditions compared to 20 years ago, and the proportion of the sub-basin declared drought affected to the sub-basin area, 20 years ago and currently
WRI-19	Climate change - temperature for Sub-Basin	Ratio of the average summer temperature over the recent history compared to that projected for the sub-basin under CC
GWI-1	Basin groundwater index	Proportion of the Basin groundwater exploitation capacity in the sub-basins
GWI-2	Groundwater sustainability index	Ratio of the exploitation capacity of the aquifer to the natural recharge
GWI-3	Groundwater availability index	Exploitation capacity of the sub-basin divided by divided by: (a) current population (VN only); (b) projected population at 2025 (VN only)
GWI-4	Overall groundwater use Index	Proportion of the total Basin groundwater realised within each of the sub-basins
GWI-5	Groundwater use per sector Index	Proportion of the sub-basin groundwater use by the sectors (towns, industrial zones, rural water supply)
GWI-6	Future groundwater use Index	2025 proportion of the sub-basin groundwater use by the sectors (towns, industrial zones, rural water supply)
GWI-7	Groundwater use & exploitation capacity Index	The ratio of groundwater use compared to the groundwater exploitation capacity, under current and 2025 conditions
GWI-8	Water level Drawdown Index	The ratio of the groundwater level of the aquifer at current conditions compared to conditions 10 years previously
GWI-9	Groundwater quality index	The % of the aquifer areas that is subject to saline water and arsenic contamination
EDI-1	Sub-Basin GDP index	Sun-Basin GDP divided by Basin GDP
EDI-2	GDP per capita index for Sub-Basins	Sun-basin GDP divided by sub-basin populations
EDI-3	GDP growth index	GDP average growth rate over the last 5 years
EDI-4	Economic structure index	Percentage of GDP provided by agriculture (A), inductry (I) and services (S) sectors

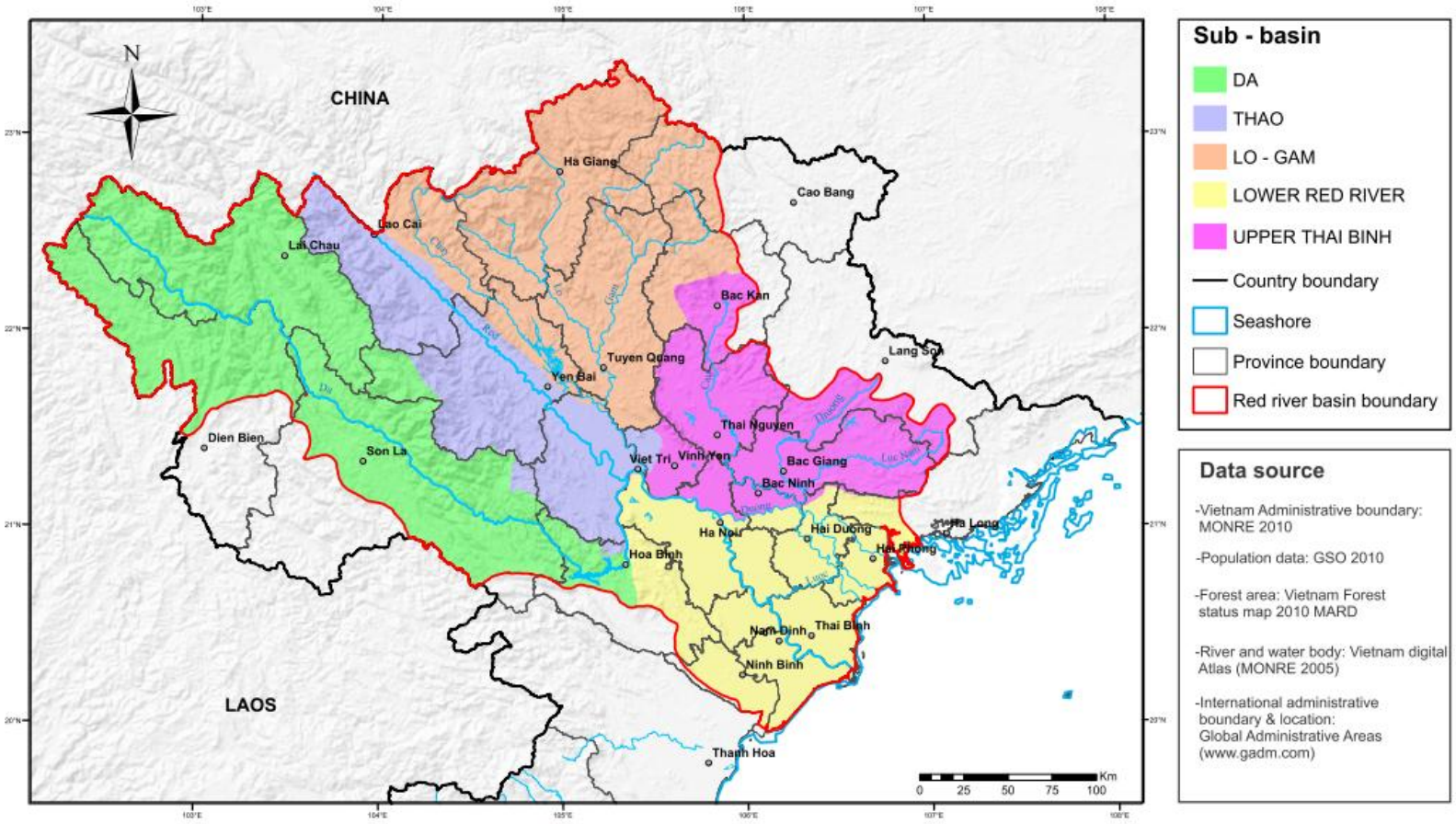
EDI-5	Industry sector production index	Value of industrial produciton divided by the water used for industrial activities
EDI-6	Irrigation sector production index	Value of irrigation produciton divided by the water used for irrigation activities
EDI-7	Irrigation development index	Proportion of the design area of irrigation schemes that is currently irrigated
EDI-8	Current hydropower generating capacity index	Current hydropower generating capacity as a proportion of the total hydropower generatign capacity of the Basin
EDI-9	Future hydropower index	Projected hydropower capacity of the sub-basin at 2025 as a proportion of the projected total Basin hydropower at 2025
EDI-10	Hydropower development index	Proportion of the full potential for hydropower development of the sub-basin currently devleoped, and developed at 2025 projections
EDI-11	Navigation Index	Economic value of inland cargo for the sub-basin as a proportion of total for Basin
EDI-12	Aquaculture Index	Economic value of aquaculture divided by the water used for aquaculture production
SDI-1	Basin population index	The sub-basin population as percentage of Basin population, both current and in 2025
SDI-2	Population growth index	Percentage of population growth experienced in the basin
SDI-3	Population density index	Basin population divided by the basin area
SDI-4	Rural urban index	Ratio of the population in rural and urban areas
SDI-5	Poverty number index	The number of people in the sub-basin community assessed as living in poverty, and the percentage of households
SDI-6	Ethnic minority index	The % of ethnic minority people in the total population
SDI-7	Employment index	Percentage of peopled employed in agriculture (A), industry (I) and services (S) sectors
SDI-8	Un-employment index	Percentage of people unemployed
SDI-9	Urban Clean water index	The proportion of people with access to clean water in urban areas at Central/Provinvial level and at District level
SDI-10	Rural Clean water index	The proportion of people with access to clean water in rural areas
SDI-11	Urban Sanitation index	The proportion of people with access to sanitation in urban areas
SDI-12	Rural Sanitation index	The proportion of people with access to sanitation in rural areas
SDI-13	Flood damage index	Total cumulative flood damages in the sub-basin over the previous 10 years as a % of sub-basin GDP

EVI-1	Land Use Index	Proportion of land area in basin used for forests (F), agriculture (A), residential (R), special purposes (S) and other (O)
EVI-2	Native forest index	Native forest area divided by total forest area
EVI-3	Species index	Number of species in red book found in basin
EVI-4	Conservation area index	Area of national parks, significant wetlands or other conservation areas as % of sub-basin area, and of the Basin total
EVI-5	Natural flow index	The proportion of the basin area that is located above major dams
EVI-6	River obstruction index	Ratio of the lengths of river upstream of river structures to the total length of the main rivers in basin
EVI 7	River level index	Ratio of the current average dry season water level at a key location compared to the level 10 year ago
EVI-8	Biological water quality index	Ambient water quality for BOD5 divided by the corresponding TCVN 5937:1995 values (Class B)
EVI 9	Domestic wastewater treatment index	For domestic wastewater, the proportion treated and the level of treatment (P=primary, S=secondary)
EVI 10	Hospital wastewater treatment index	For hospital wastewater, the proportion treated and the level of treatment (P=primary, S=secondary)
EVI 11	Industrial wastewater treatment index	For industrial wastewater, the proportion treated and the level of treatment (P=primary, S=secondary, T=tertiary)
EVI 12	Solid waste index	The % of solid waste that is collected and dispoded of in urban (U) and rural (R) areas
WMI-1	Recorded Streamflow Index	The number of Level 1 gauging stations (National) in the sub-basin, and the number of years of record at the station with the most years
WMI-2	Overall groundwater Assessment Index	The % per total area of aquifer in sub-basin assessed in each class (A, B, C)
WMI-3	Monitoring bore index	Number of National level monitoring bores per sub-basin, and the number of years of record at the bore with the most years
WMI-4	Environmental Monitoring Index	The number of installed sites for monitoring water quality (WQ) and ecological health (EH)
WMI-5	Central Licensing Index	The number of licences for the basin issued by MoNRE for surface water extraction (SW), groudnwater extraction (GW) and wastewater discharge (WW)
WMI-6	Provincial Licensing Index	The number of licences for the basin issued by Provinces for surface water extraction (SW), groudnwater extraction (GW) and wastewater discharge (WW)

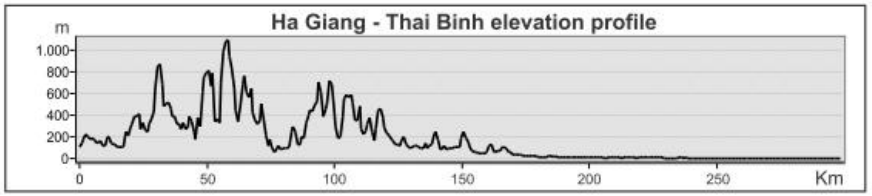
WMI-7	Decision 64 Index	The number of pollution establishments listed in Decision 64 that have been completed (C), are in the process of treatment (P), or have not yet been dealt with (N)
WMI-8	Pollution Fees Index	The total value of pollution fees collected under Decree 67/2003 and the proportion of this from urban (U) and industrial (I) polluters
WMI-9	Urban Pollution Fee Rate Index	The total value of pollution fees collected under Decree 67/2003 from urban centres divided by the urban population
WMI-10	EIA Index	The total number of EIA reports (Re) assessed and approved and the number of registration forms (Rf) issued to establishments that achieve environment standards
WMI-11	Industrial Zone EIA Index	The % of Industrial Zones with EIA reports (Re) assessed and approved
WMI-12	Inspections Index	The average number of inspections a year compared to the number of EIA reports and licences issued in the sub-basin
WMI-13	Urban Cost Recovery Index	The % of the average yearly costs of urban water services that are recovered through revenue
WMI-14	Urban Water Efficiency Index	The % of water losses in the supply system
WMI-15	Water resources management Human Capacity Index	The number of people working on water resouces management per 1 million people in the sub-basin
WMI-16	Water resources management Investment Capacity Index	The value of the state/provincial budget applied to water resources management per sq km of sub-basin area

4.2 Appendix 2 – Maps produced

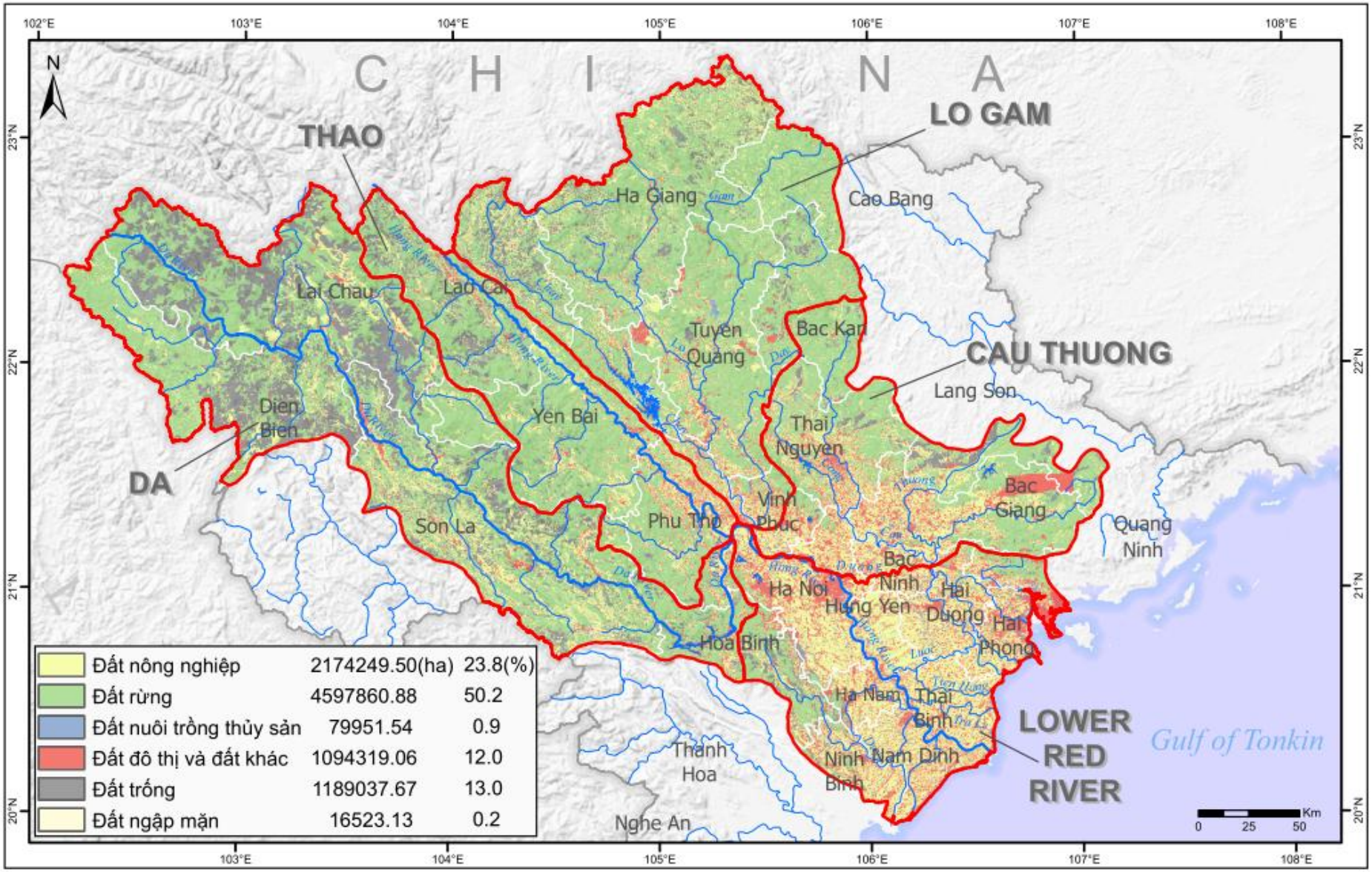
Base map of the basin



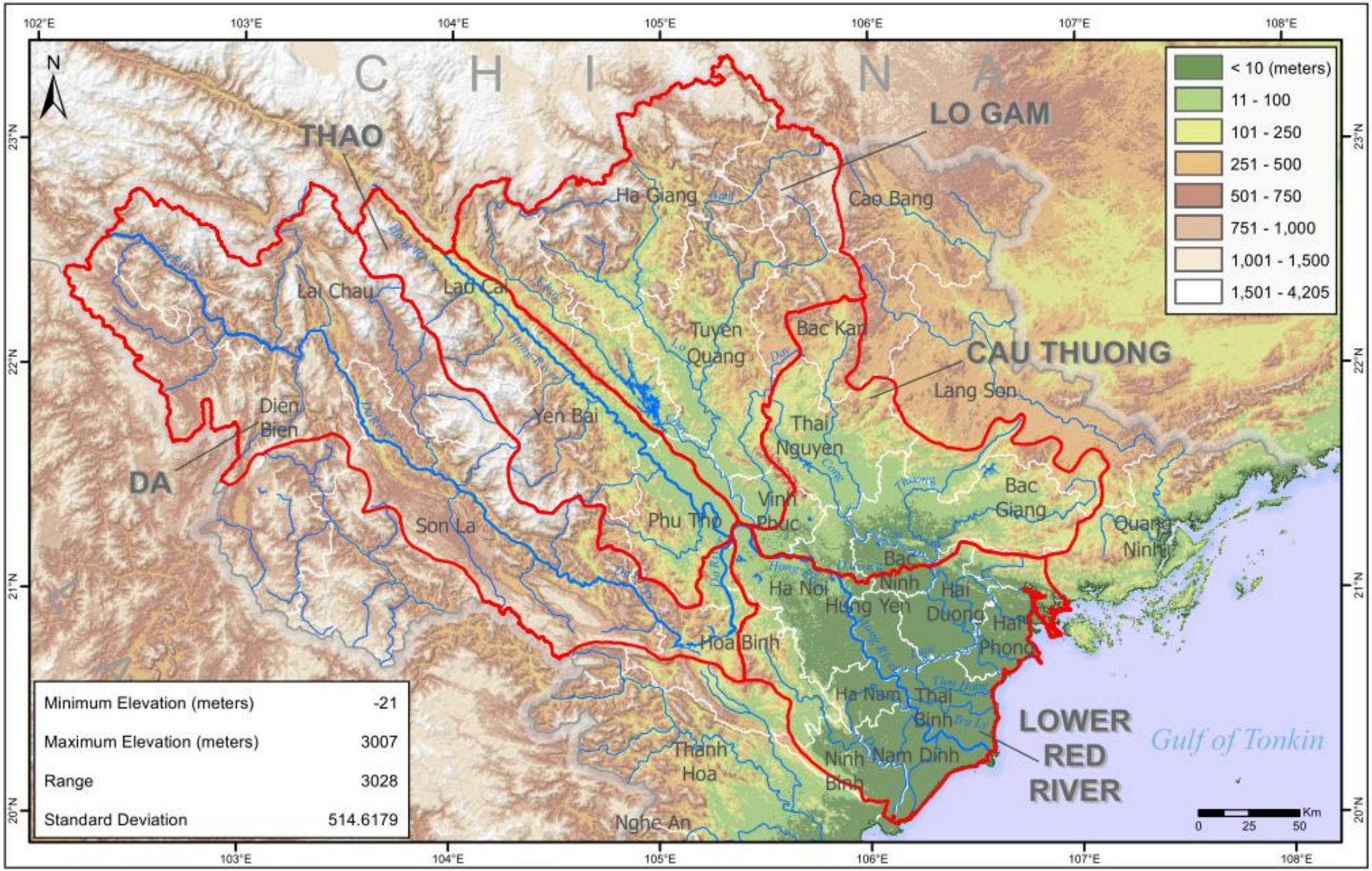
Sub-basin	Area (km2)	Population	Native forest (percent)	Natural flow
DA	26,599	1,632,961	43	
THAO	12,488	2,458,456	36	
LO-GAM	22,354	2,193,188	45	
LOWER RED RIVER	14,567	16,703,202	5	
UPPER THAI BINH	14,102	5,418,259	26	



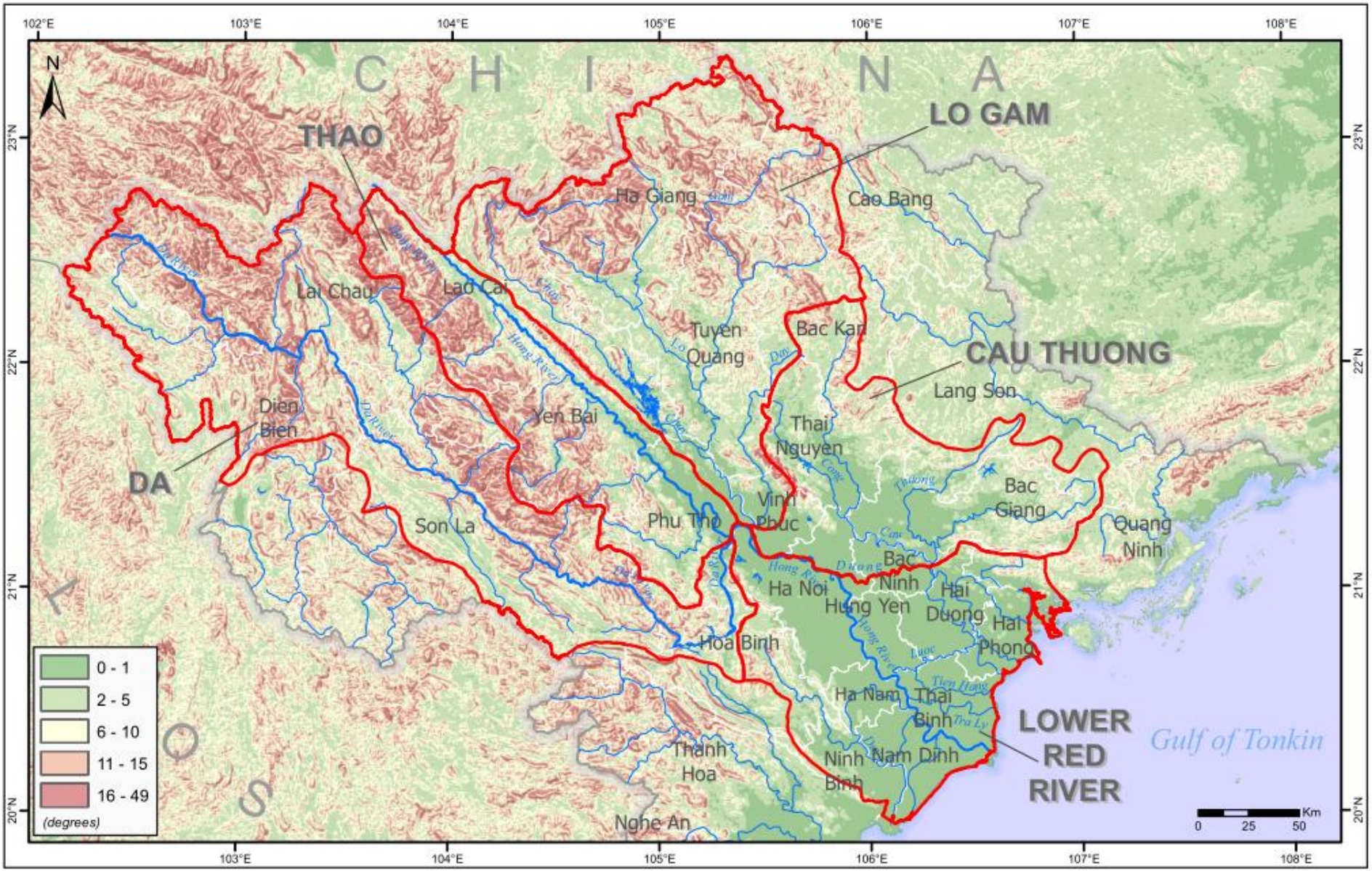
Land Cover Charasteristics 2010



Elevation Characteristics



Slope Charasteristics



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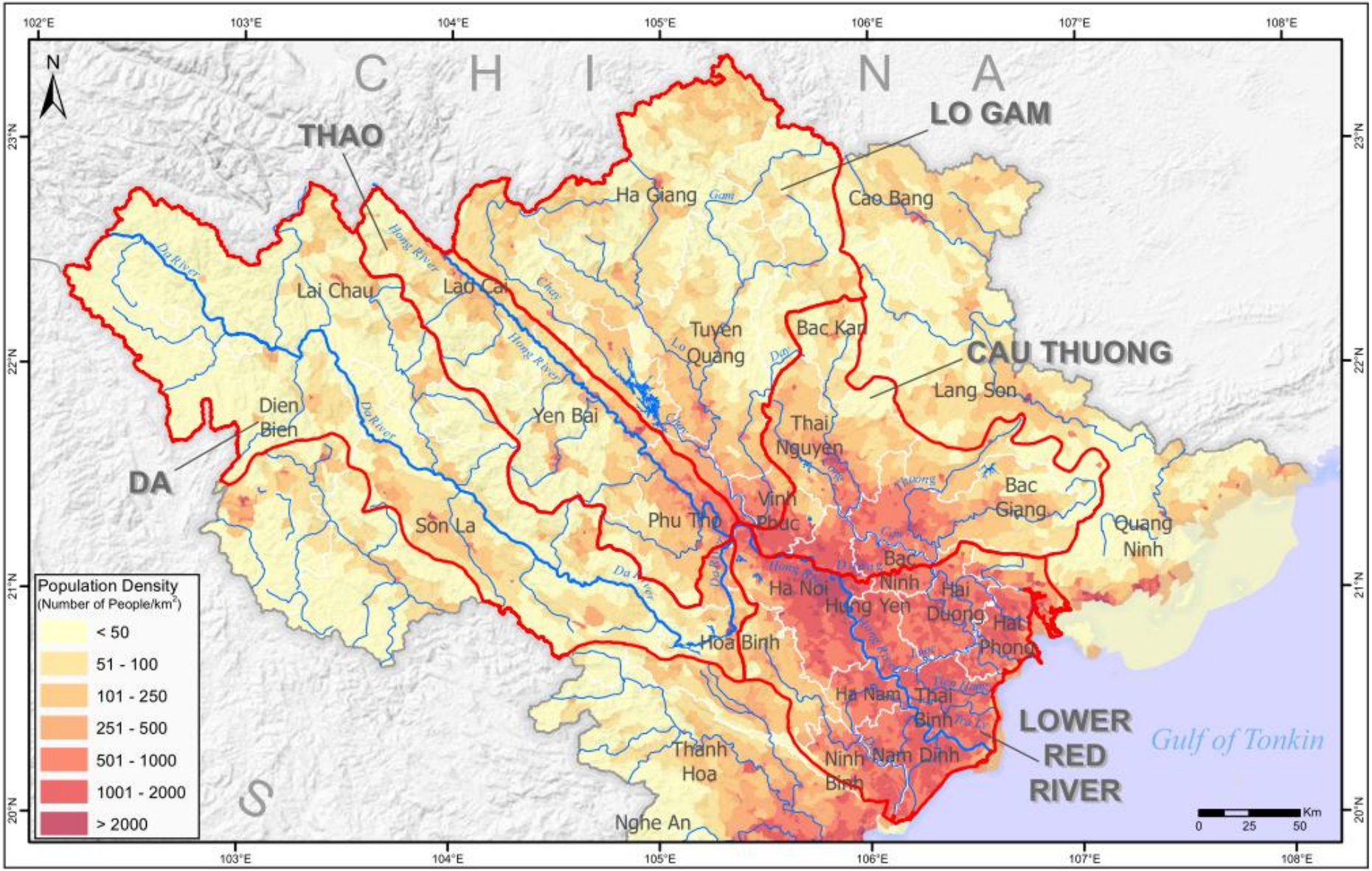
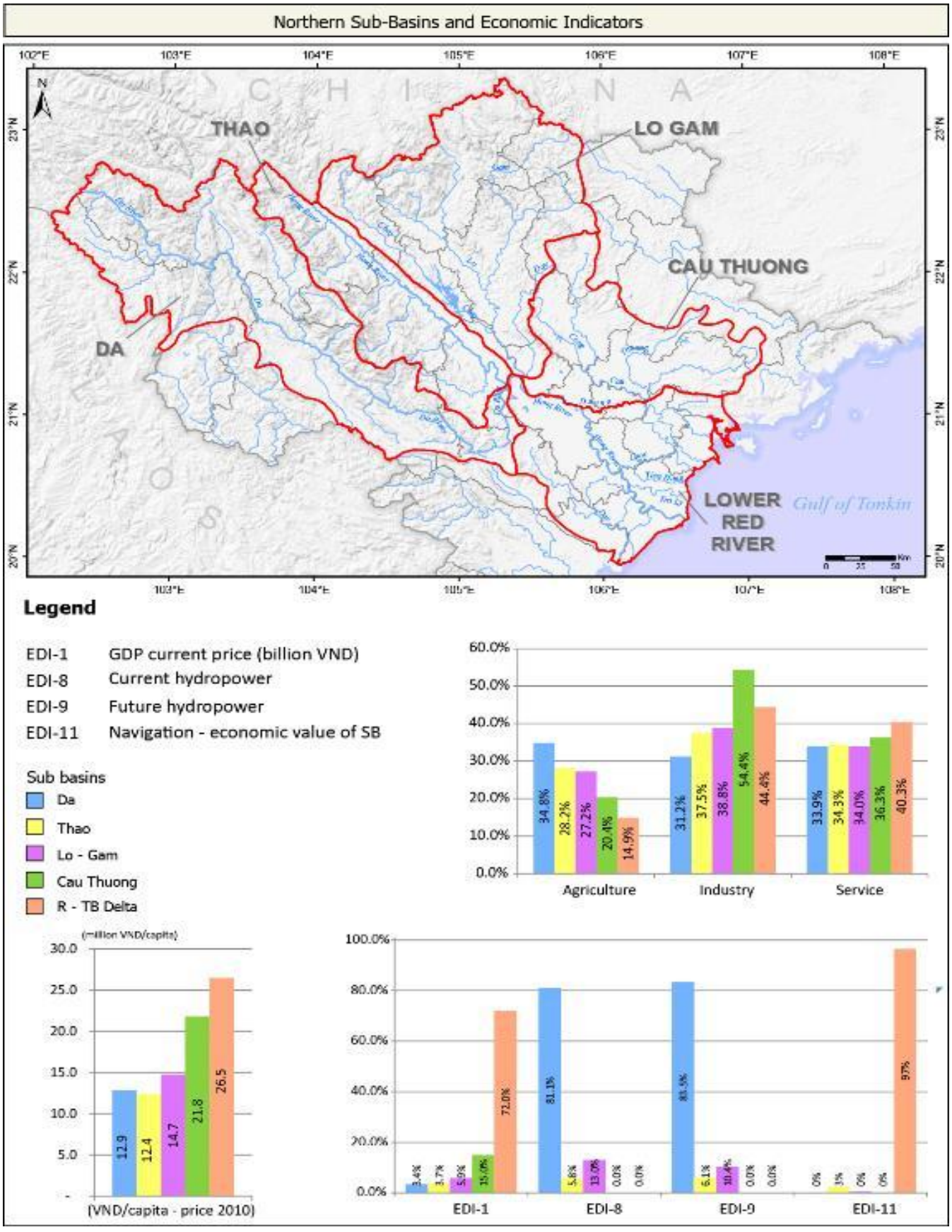
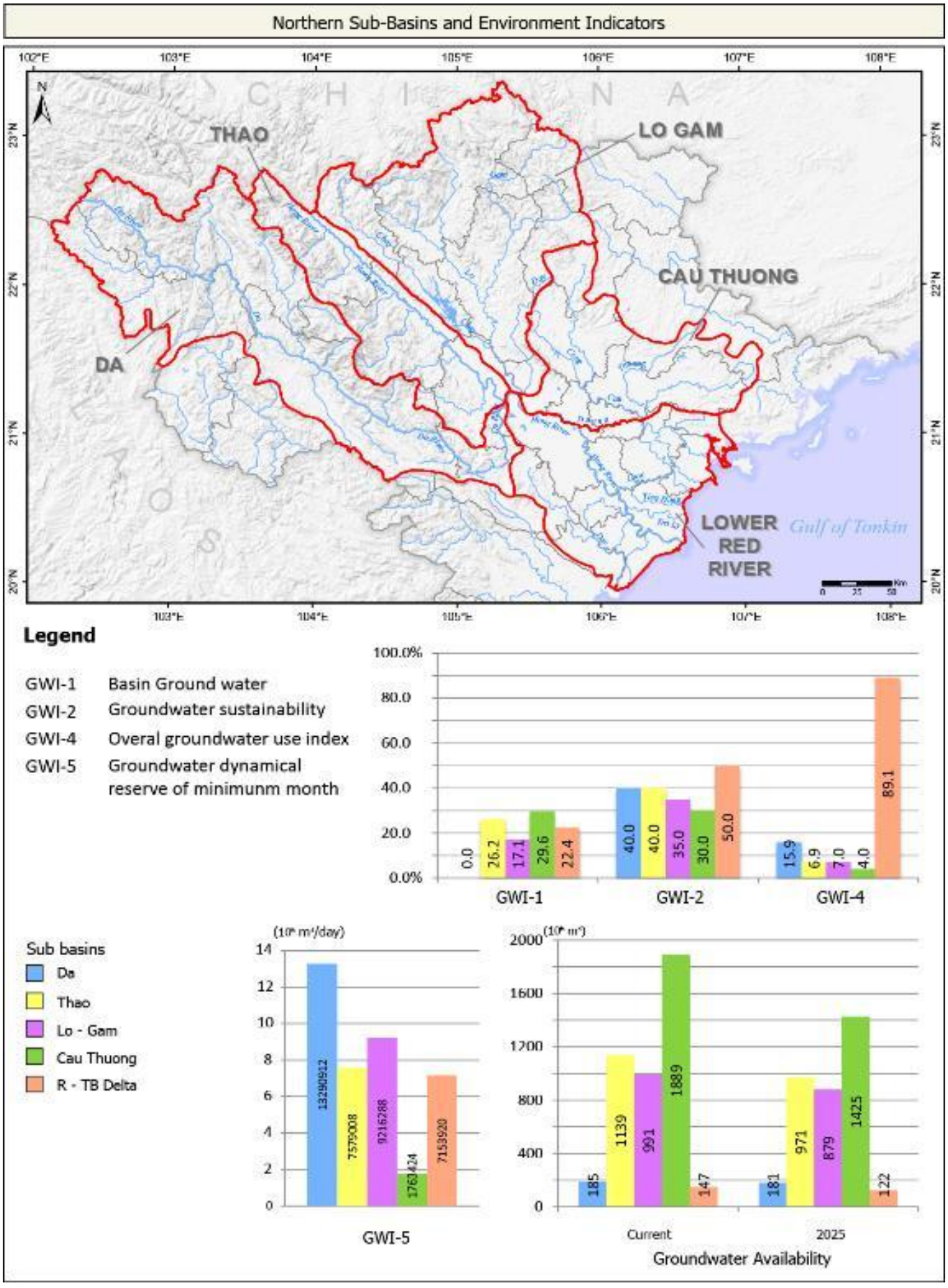
Population Charasteristics 2005



Economics indicators



Environment indicators



Water resource management