

ABSTRACT

Protected areas (PAs) are areas of particular importance for biodiversity and ecosystem services. Increasing awareness, sharing information and knowledge of PAs are key elements for their sustainability. Among sharing information media, web map has become a novel source that provides spatial information effectively and web maps of PAs have been paid attention. In Vietnam, using web maps for sharing information of PAs is less common. In the meantime, one of the cartography advancement results is multiscale map. Therefore, this study aims to develop a multiscale web map of Vietnam PAs. Its objectives are to create maps of PAs at different spatial extensions and publish them as a multi-level web map. This is an empirical research, beginning with literature review on multiscale and web map, to determining spatial extents intended to be viewed and rules for setting the scale range through those extents. Next step is to define symbol transformation across scale range to ensure visual continuity at all scales so that the map communicates effectively. Data was conducted with national parks (NPs) - the type of PAs with highest biodiversity importance. The web map was developed via Esri's ArcGIS Platform. Specifically, GIS data were manipulated, symbolized for desired scales, created as web applications and as web map with ArcGIS Desktop, ArcGIS Pro, ArcGIS online, ArcGIS Web AppBuilder and ArcGIS Experience Builder, respectively.

Research result is a web map of Vietnam PAs with the spatial extents spanning from national, regional, provincial to PA level. Spatial extents for experiment map at regional, provincial and PA level is North Centre Region, Quang Binh province and Phong Nha - Ke Bang NP, respectively. The web map configures basis interactive tools such as legend display, base-map gallery, layer management, measurement, radius search, and selection. Through web map services, spatial information of Vietnam PAs is accessible anytime and anywhere. The result shows that the rules for setting scale range for multiscale map of PA are reasonable and feasible. However, more experiments need to be done so that the rules can be applicable to elsewhere.

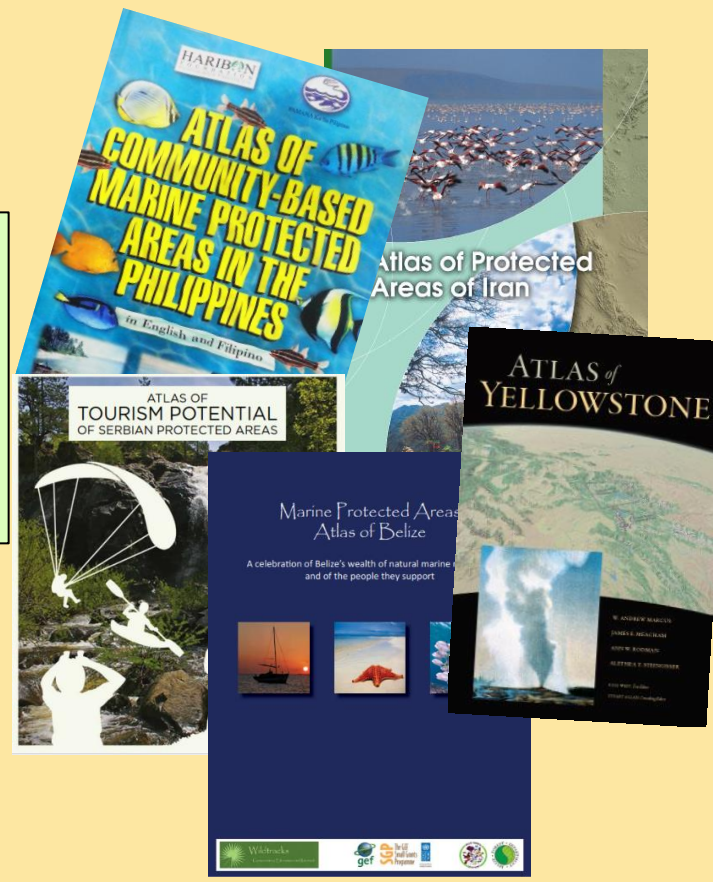
Key words: Protected areas, multiscale map, web map

1. INTRODUCTION

PROTECTED AREAS (PAs)

- Areas of particular importance for biodiversity and ecosystem services
- The Programme of Work in the Convention on Biological Diversity (CBD)
- The central element of the other programmes of CDB Work

Increasing awareness, sharing information and knowledge of PAs are key elements for their sustainability.



WEB MAP

- Access anywhere and anytime
- GIS technology advancements: multi-scale web map
- The central element of the other programmes of CDB Work.



Develop a multi-scale web map of Vietnam Protected Areas

2. METHODS

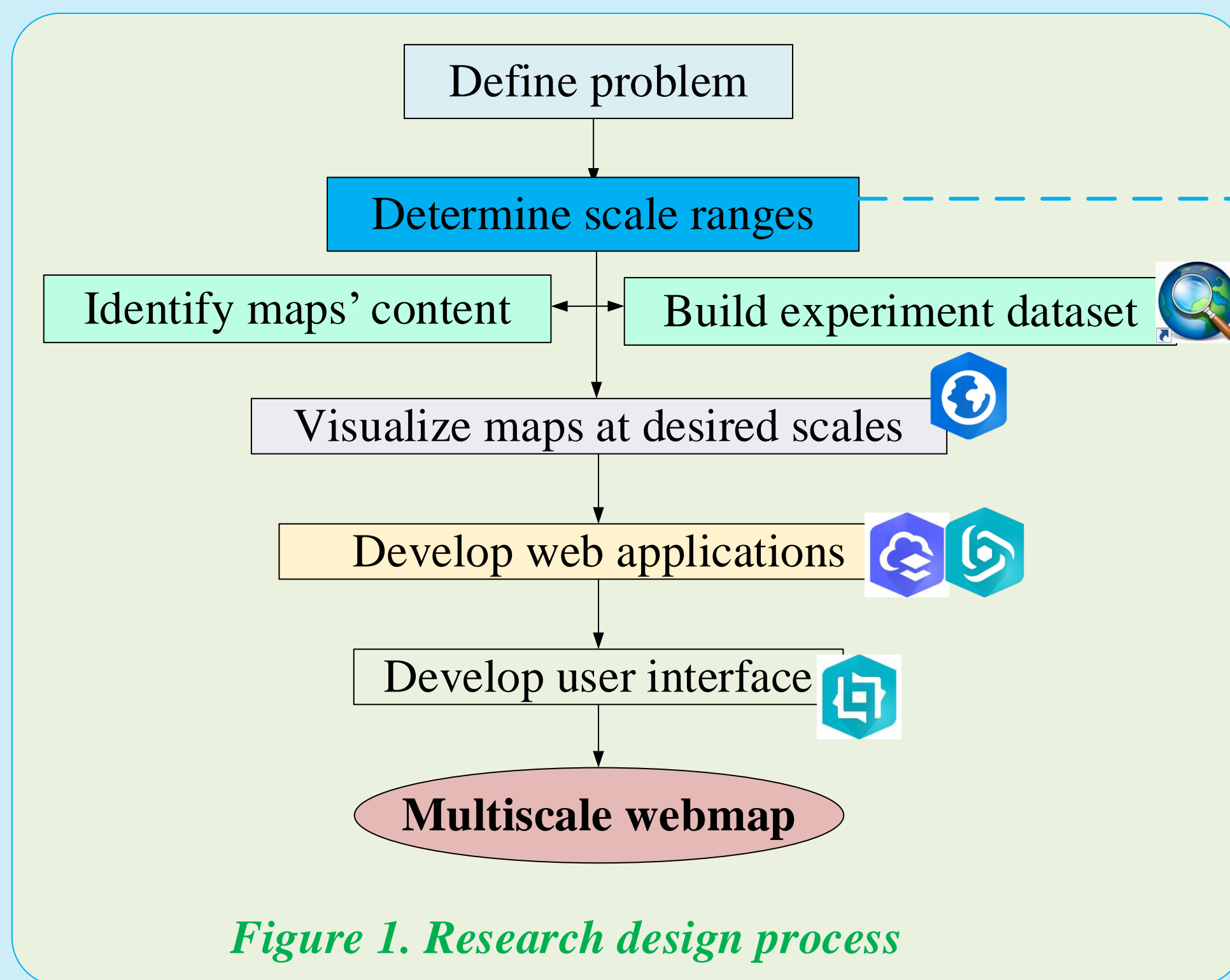


Figure 1. Research design process

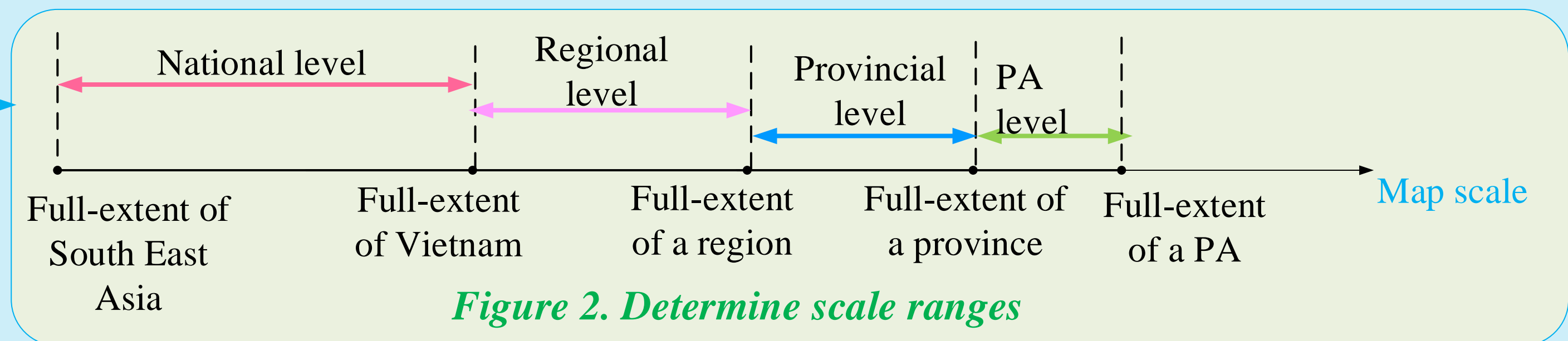


Figure 2. Determine scale ranges

- + Firstly, we determined spatial extents intended to be viewed. The spatial extents were set to fit administration levels which spanning from national, regional, provincial to PA level. The maximum and minimum visible scales for each administration level are the full map extent of that level and the full map extent of an adjacent higher level, respectively (Figure 2)
- + Then, we identified the contents for desired maps at spatial extensions, which include the distribution of PAs (national and regional level), of PA functional zones (provincial level) and of natural – socio-economic characteristics inside a PA (PA level).
- + Meanwhile, input data were also collected from online sources, including the World Database on PAs (shapefiles of Vietnam PAs boundaries), Diva-GIS (shapefiles of Vietnam administration levels) and ArcGIS online (PhongNha-KeBang national park or PN-KB NP map package). They are manipulated as needed (i.e. update, re-projection, geometry conversion).
- + Next, we authored pre-defined maps at desired scales. Each single map was designed for best view at the full-extent of an administration units to be viewed and we defined simultaneously symbol transformation across the range of scales to ensure visual continuity at all scales. All composed maps were then ready to make web map.

3. RESULTS AND DISCUSSIONS

+ The experiment was conducted at spatial extension of Vietnam, North Centre region, Quang Binh (QB) province and PN-KB NP, within the scale range (Figure 3). Pre-defined maps were conducted with computer screen and designed to be viewed at spatial extension of Vietnam (1:30,900,000 - 1:11.700.000), North Centre region (1:11.700.000 - 1:3.700.000), QB province (1:3.700.000 - 1:900.000) and PN-KB NP (1:900.000 - 1:300.000).

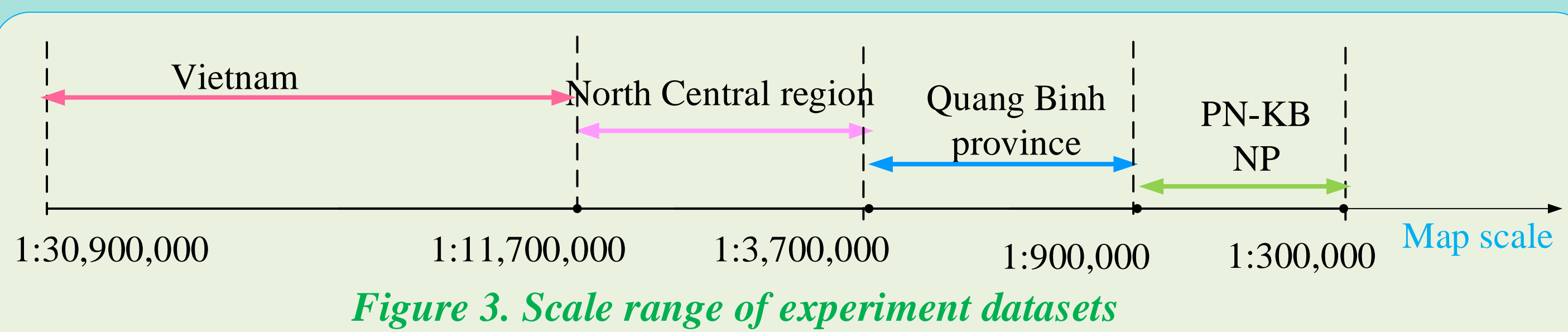


Figure 3. Scale range of experiment datasets

- + All contents are symbolized in ways that ensure visual continuity wherever applicable (Figure 4). The web map is held on Esri's GIS cloud and configured with basis interactive tools such as legend display, base-map gallery, layer management, measurement, radius search, selection.
- + Through web map services, spatial information of Vietnam PAs is accessible from <https://experience.arcgis.com/experience/28a7dff94c24472c989a844478843111>.
- + This study proposed rules for setting scale range for multiple representation of PA map.
- + They are reasonable and feasible, but require testing more elsewhere in order to be applicable to other types of PAs

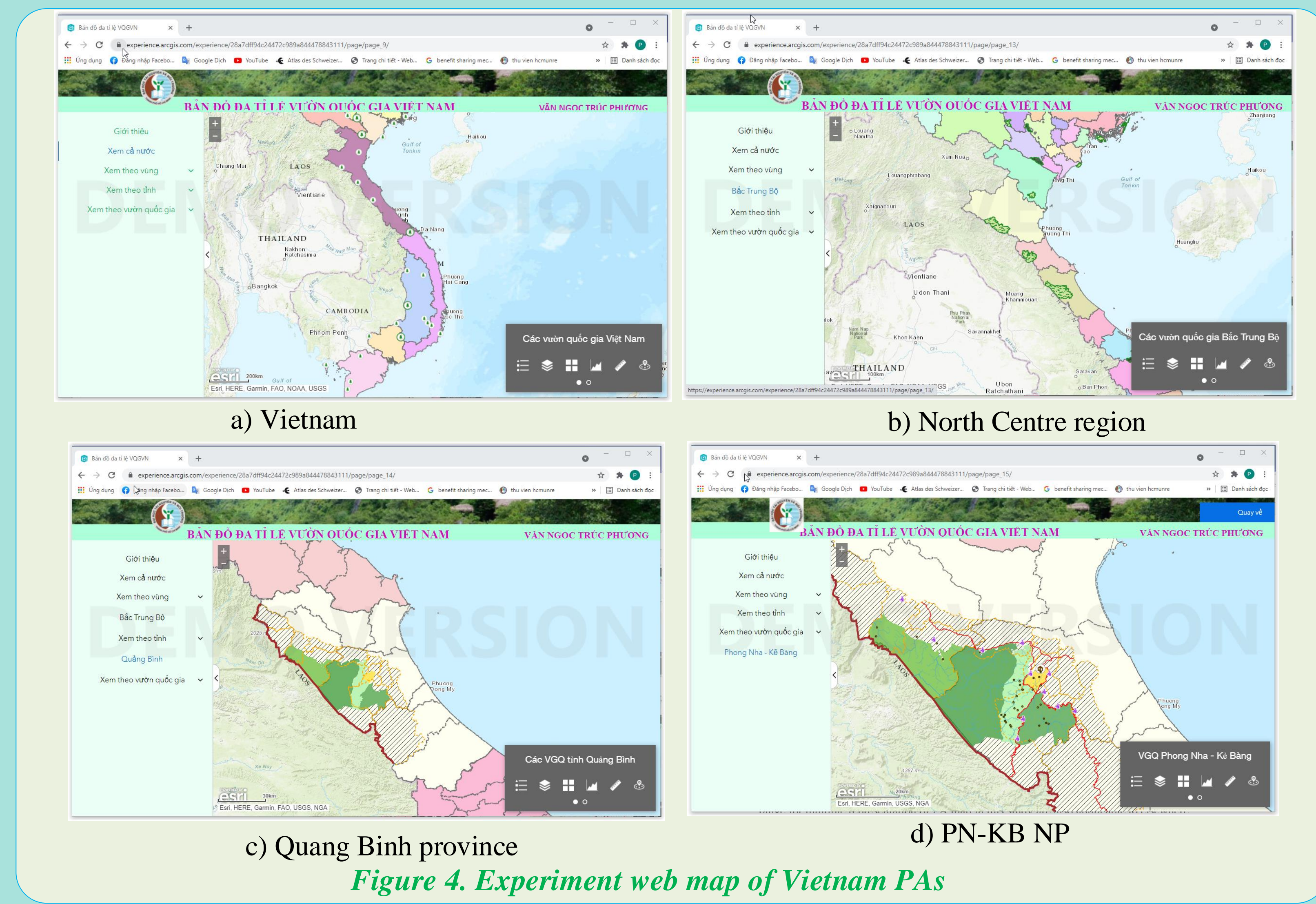


Figure 4. Experiment web map of Vietnam PAs

4. CONCLUSIONS

- Increasing awareness, sharing information and knowledge of PAs are key elements for their sustainability. Web map providing spatial information of PAs has been paid attention.
- This study is aiming at develop a multiscale web map of Vietnam PAs and experiment with ArcGIS platform.
- Result is the web map with interactive tools, across spatial extensions, spanning from national, regional, provincial to PA level.
- The result shows that rules for determining scale range for multi-representation of PA map are reasonable and feasible.
- More experiments need to be done so that the rules can be applicable to elsewhere.

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