
# Dong Van hydropower station

Dong Van Karst Plateau UNESCO Global Geopark
(DVUGGp) Ha Giang Province, Vietnam

## Innovative and sustainable water supply technologies for karst areas

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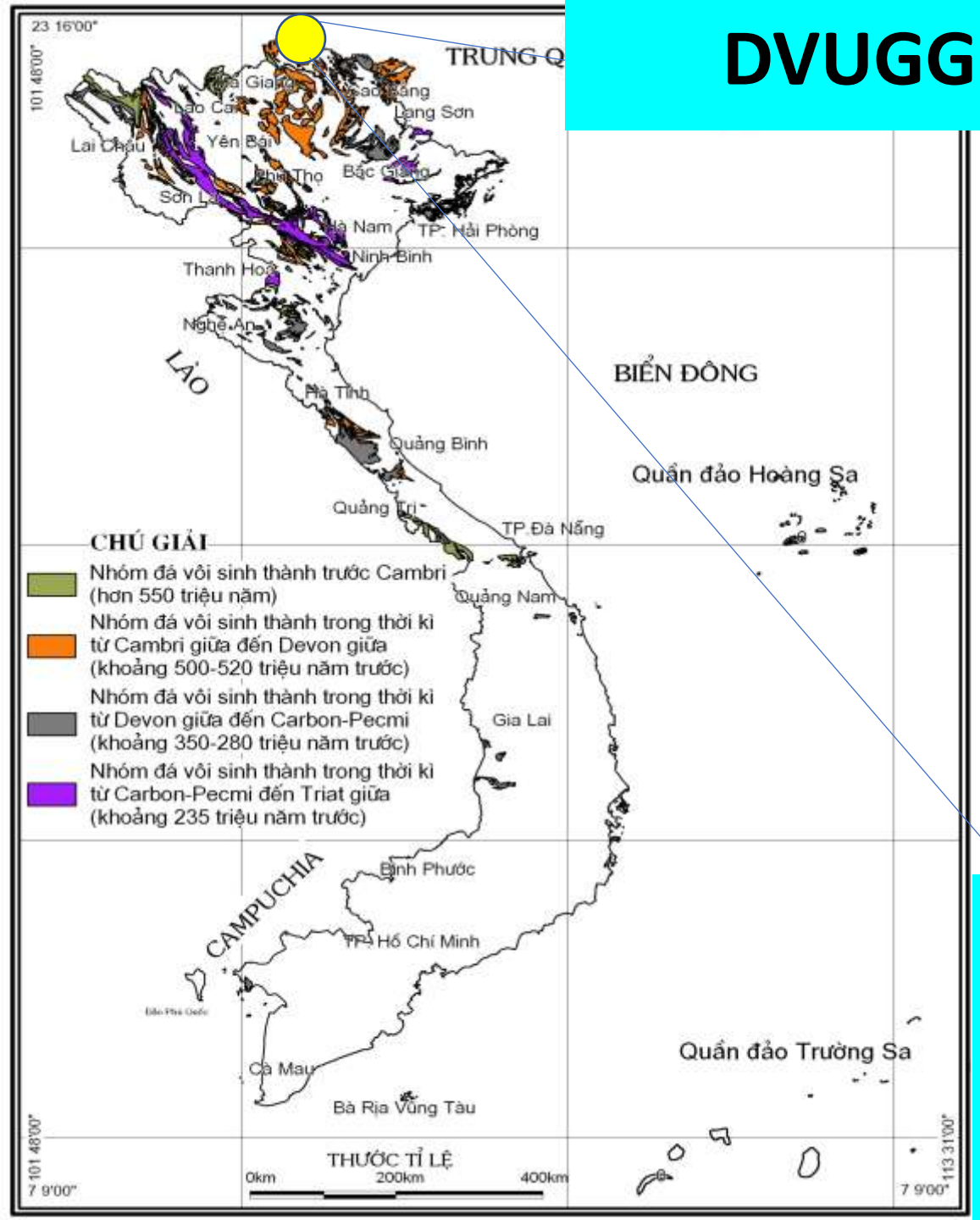
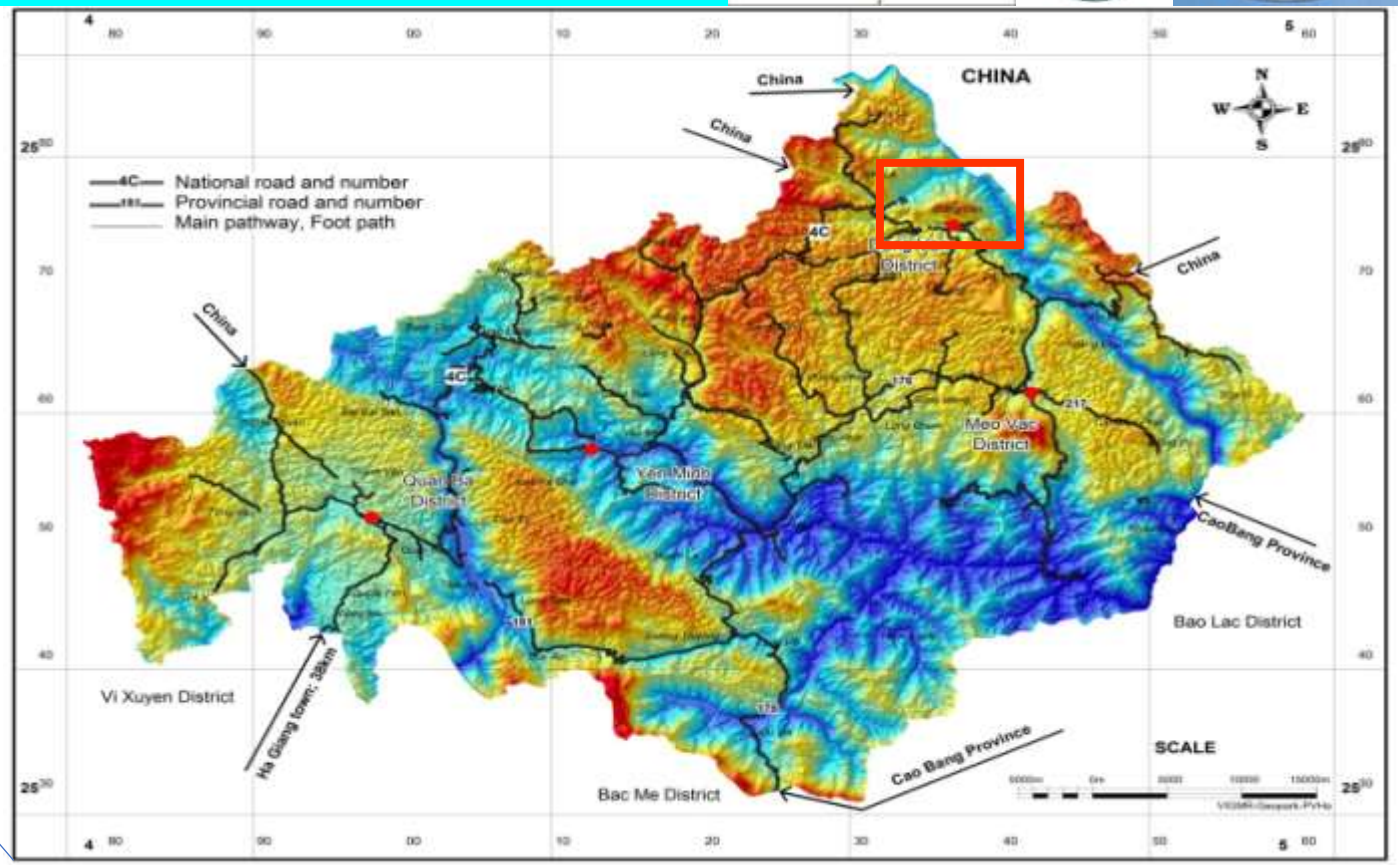
On behalf of many other Vietnamese-German-Belgian friends and colleagues

# DVUGGp: Introduction




- Ca. 60.000 km² or 18% of land surface
- DVUGGp ca. 2,360 km²; ca. 60% karst
- 200-2,000m asl; 1,000m avg.
- 17 ethnic groups; about 250,000 people
- Geopark set up 2009, UGGp 2010

# DVUGGp: Introduction

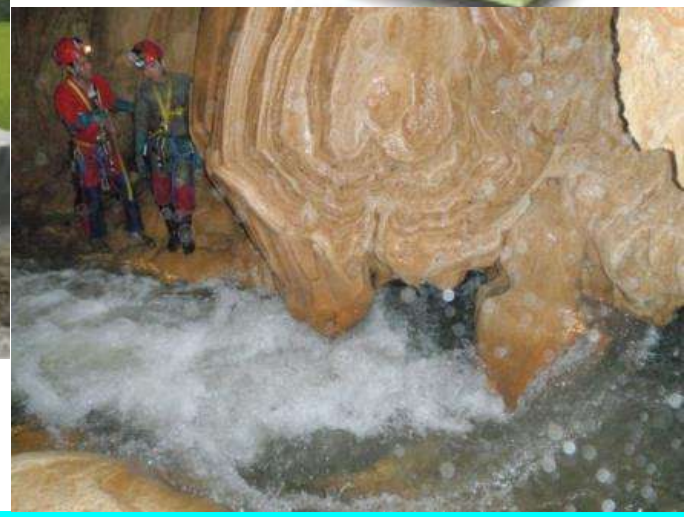
**Majestic but rugged landscape, as much as 800m difference in altitude**

# DVUGGp: Introduction

**Colourful multi-ethnic cultures, high bio- and geo-diversity, but scarce in land for living and cultivation**

# DVUGGp: Problem Of Water Supply





Due to karst nature, rare surface springs, deep (300-400m) underground water, difficult and high cost to pump up → extremely scarce in water in dry season

# DVUGGp: Problem Of Water Supply

- Current solution - “hanging lakes”
- 120 lakes were built since 2007
- Capacity 2,000-5,000$m^3$ each
- For 20% population, 45 l/pax/day
- Need 300 more for storing 1-1.5 mil. $m^3$ for 250,000 people

- Costly, ca. 500k-1 mil. USD each
- Difficult and time consuming to built, some quickly go out of use
- Sanitary and hygienic problem
- Environmental unfriendly

- Can’t meet basic requirements for visitors

**URGENT NEED FOR INNOVATIVE AND SUSTAINABLE WATER SUPPLY TECHNOLOGIES**

# DVUGGp: Target

Vietnamese-German Cooperation for the Development of Sustainable Karst Water Technologies (KaWaTech)

**A multi-party cooperative project, jointly funded by:**

- German Research and Education Ministry (BMBF)
- Vietnam Ministry of Science and Technology (MOST)
- Ha Giang Province People's Committee

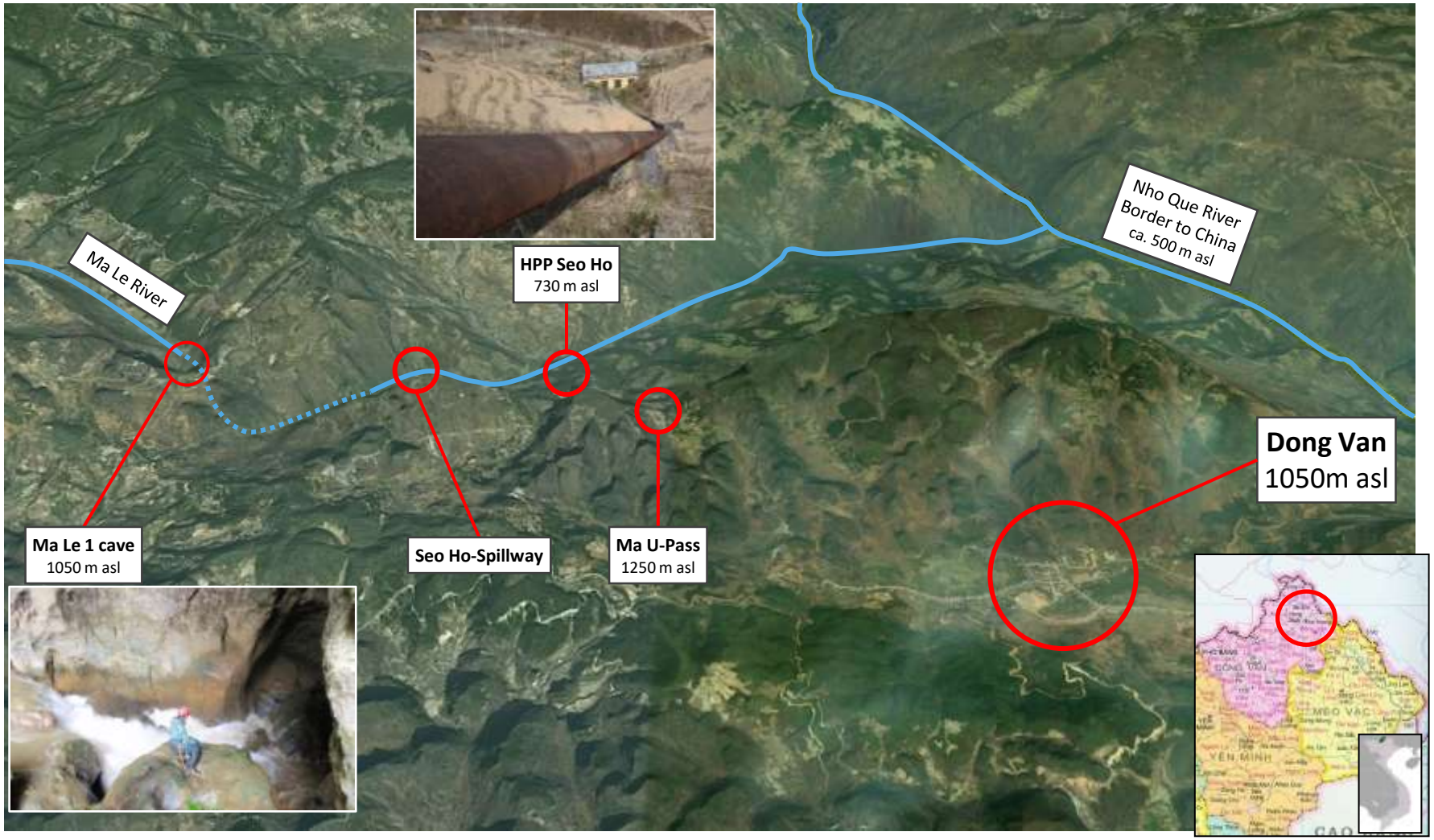
**Jointly implemented by: KIT, VIGMR and many other German and Vietnamese companies and institutions, and some Belgian friends**

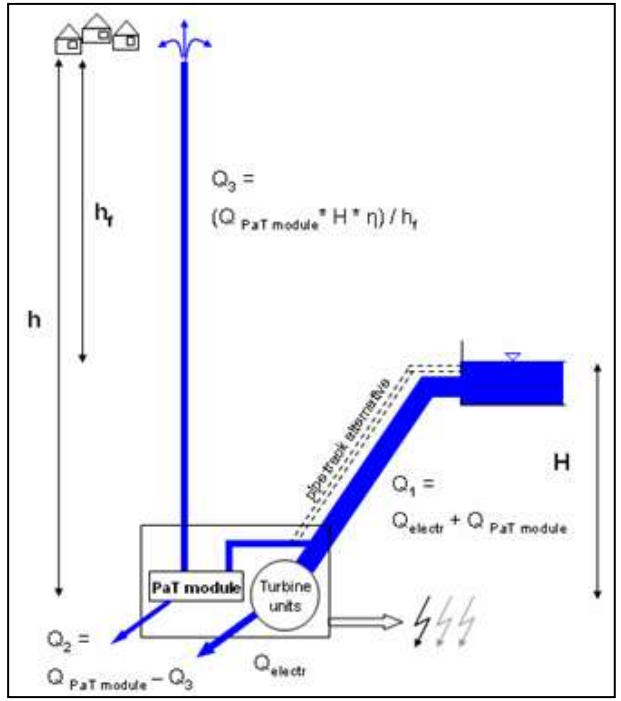
**Jointly coordinated by:**

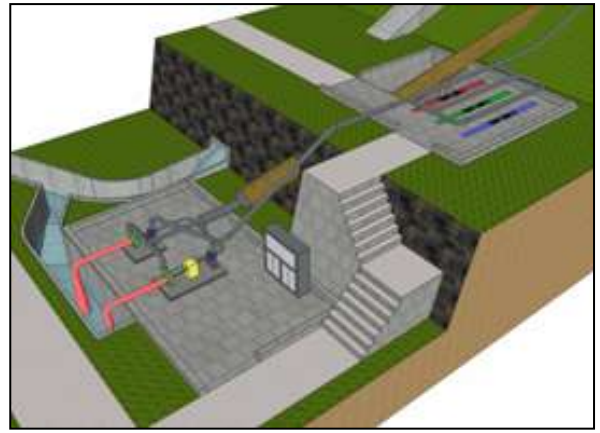
- Karlsruhe Institute of Technology (KIT)
- Vietnam Institute of Geosciences and Mineral Resources (VIGMR)
- Ha Giang DOST

- First visit to the area: 2009
- Project preparation & approval: 2010-2013
- Project start: 2014
- Road, water tanks, pressure & distribution pipe, PAT pumps, trainings etc.
- First water pump up: 2019

# DVUGGp: Implementation



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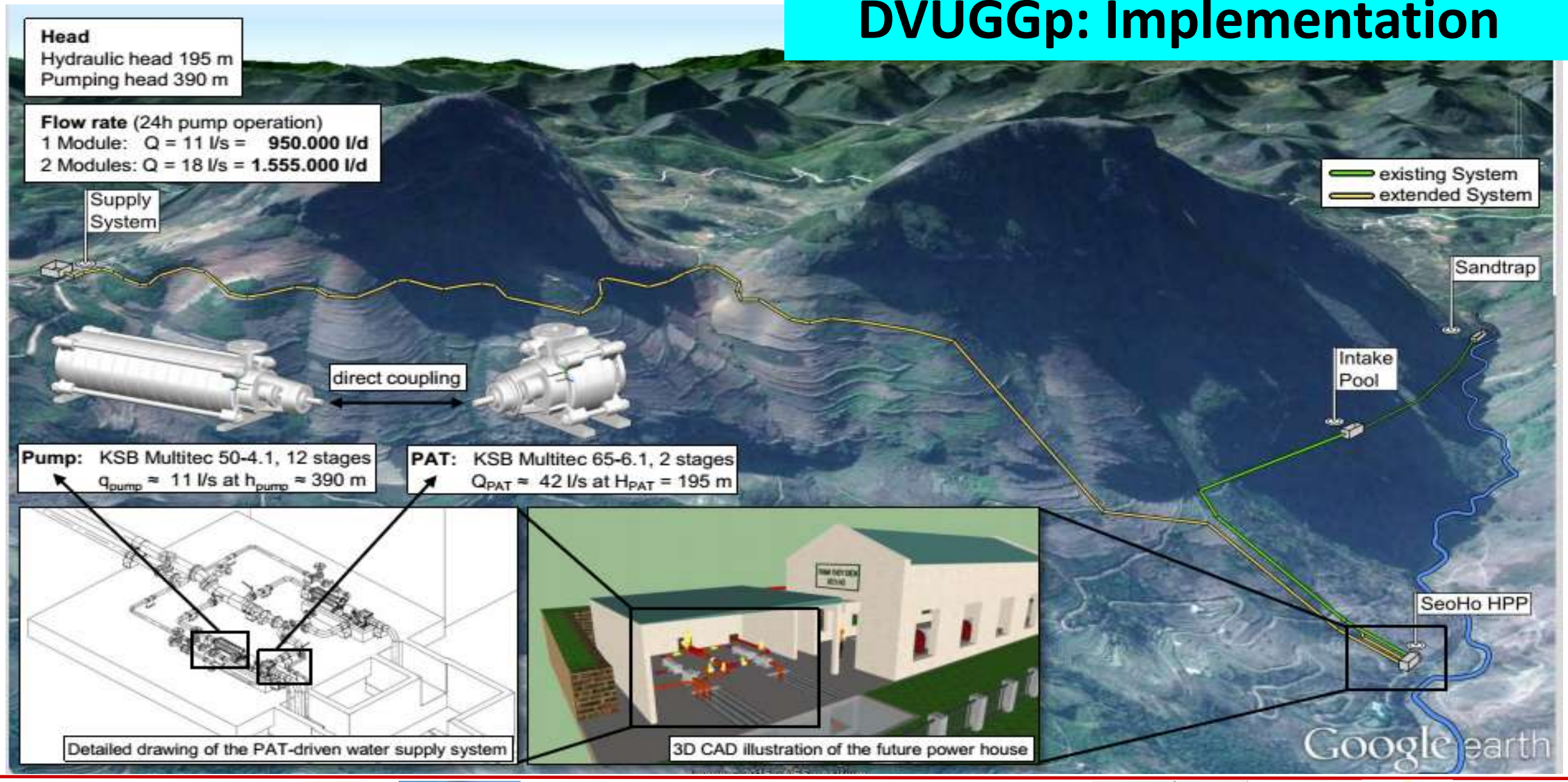

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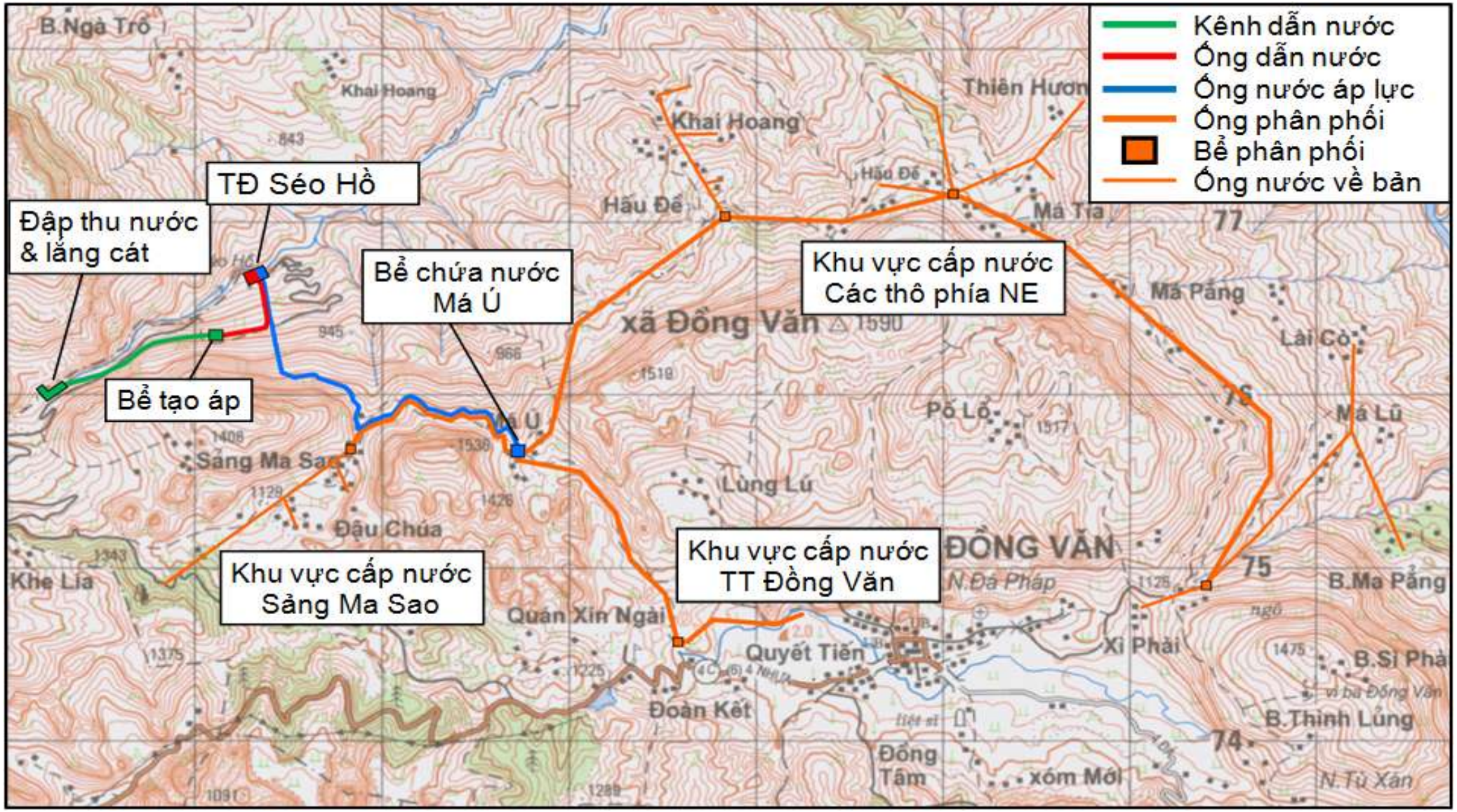

# DVUGGp: Implementation

# DVUGGp: Results Achieved/Impact

- All year round operation, even at the minimum spring discharge of 50 l/s
- Hydraulic head: 195 m; Pumping head: 390 m

- → From Seo Ho hydropower station to Ma U water tank on the watershed: 585 m
- From Ma U water tank down to Dong Van town: 250 m (by gravity)

- One module: 950 $m^3$/day (24 hours) → ca. 300,000 $m^3$/year
- Two module: 1,555 $m^3$/day → ca. 500,000 $m^3$/year
- Enough for 9,500 - 15,550 people at 100 l/day (currently Dong Van town ca. 7,500 people)

- 3-4 such systems would provide 1,5-2,0 mil. $m^3$ of running water = 400 “hanging lakes”
- Robust technology, no operational cost and little maintenance
- If properly maintained, can last 30-40 years → **immense multiplication potential**

# DVUGGp: Lessons learned/Future Steps


- **Phase 2: Water treatment plant at Ma U summit, decentralized solar water pumps for remote and isolated villages and multiplication to the neighbouring district of Meo Vac**
- **A revolution in water supply for karst and other mountainous areas!**