Open-data mapping of ecosystem service provision using Co$ting Nature v3.0

Comprehensive conservation prioritisation

Effective decision making on conservation investments, land use planning and infrastructure development requires comprehensive spatial data on **nature's contributions to human wellbeing** (ecosystem services) and their tradeoffs with land use.

Co$tingNature maps biodiversity, 13 ecosystem services, current human pressure and future threats globally in detail to identify **conservation** and **development** priorities
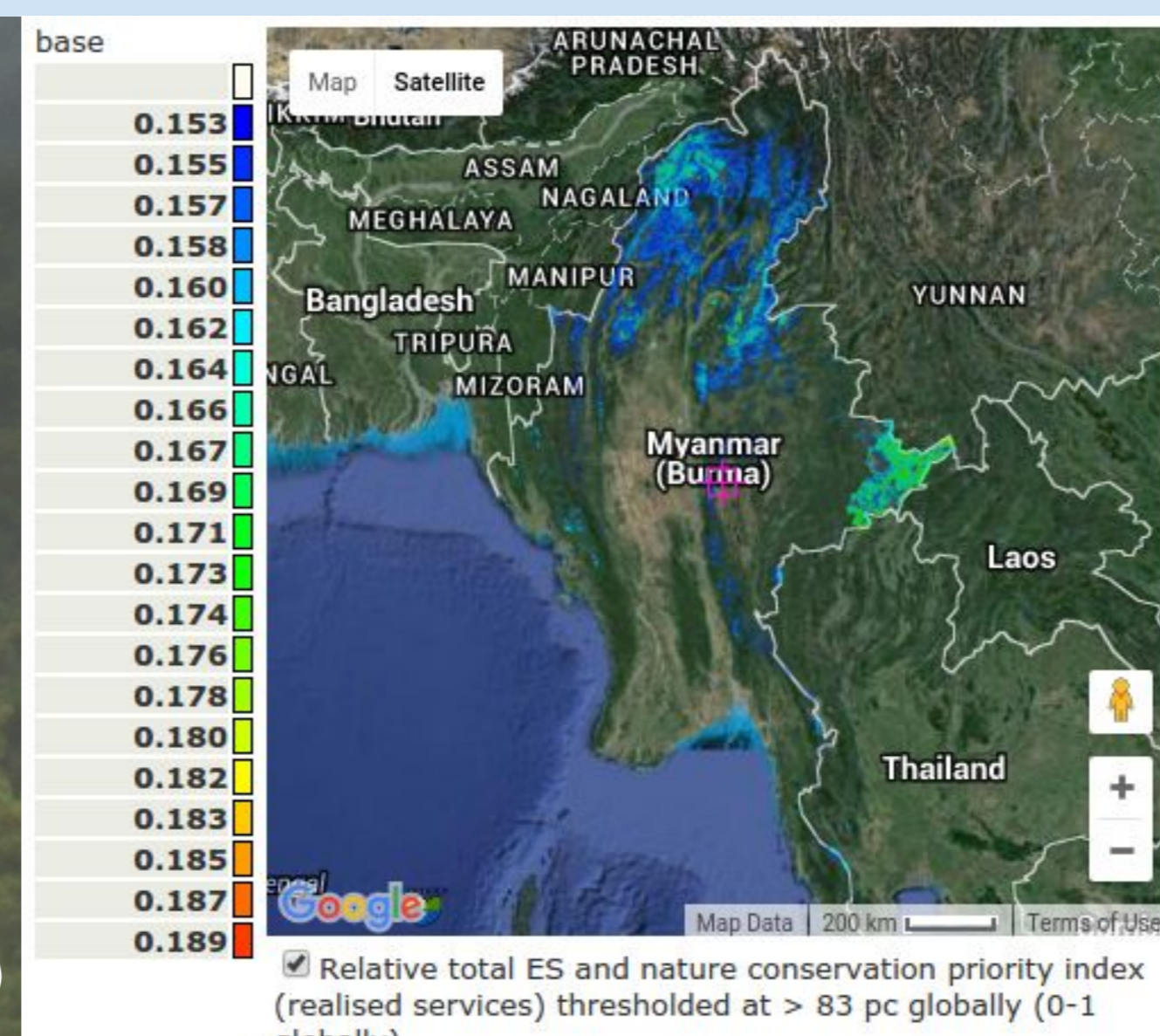
13 Ecosystem services:
- Timber (softwood, hardwood),
- Fuelwood (softwood, hardwood),
- Grazing/fodder,
- Non-wood forest products,
- Water provisioning (quantity,quality),
- Fish catch,
- Carbon,
- Natural hazard mitigation (flood,drought,landslide,coastal inundation),
- Culture-based tourism,
- Nature-based tourism services,
- Environmental and aesthetic quality services,
- Wildlife services (pollination,pest control),
- Wildlife dis-services (crop raiding, pests),

- **Detailed**, sophisticated model, since 2007, v3:2017)
- **Spatial**, local to global (1ha, 1km or 10km spatial resolution). All required **data supplied** for anywhere globally for **fast** analysis (in 10 minutes)
- **Simple** *to use* (browser based, no GIS req'd)
- **Inbuilt uncertainty** and **validation** tools
- Sophisticated land use **scenarios** and conservation **prioritization** tools
- V3: Economic valuation and analysis of trade-offs
- Results **downloadable** in GIS formats
- **Training** materials, >1200 users globally
- **Published** *e.g.*: <u>Mulligan et al., (2010)</u>, <u>Mulligan (2015a)</u>, <u>Mulligan (2015b)</u>
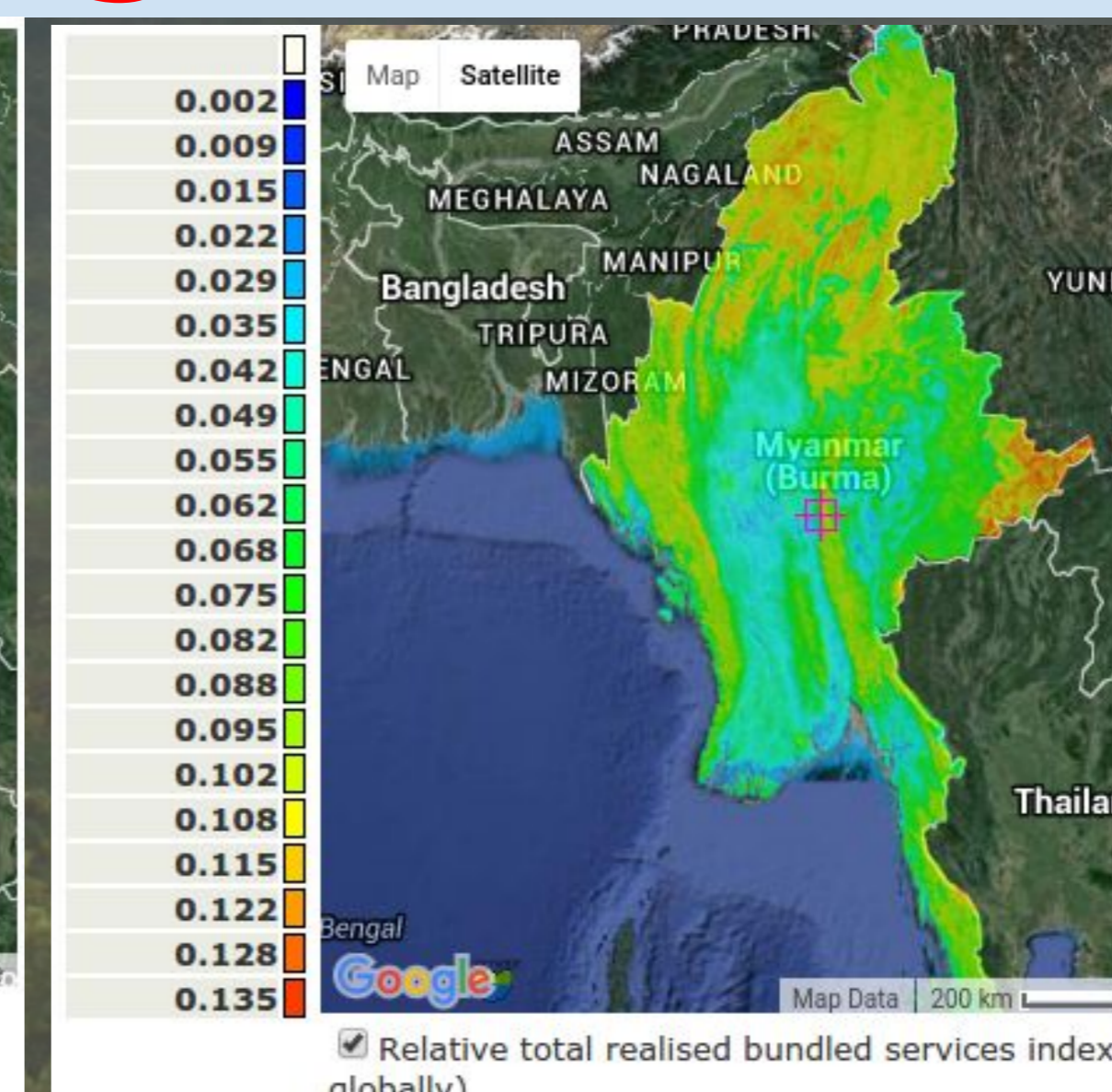
Applications of Co$tingNature

What questions does the tool answer?
- **What ecosystem services** does a pixel or area provide ? For anywhere globally.
- Which is the (locally, nationally, globally) **most important** service provision by a pixel or area?
- **What is the biodiversity** of a pixel or area (incl richness and endemism)?
- What is the **delphic conservation priority** of a pixel, area?
- Which services benefit **local vs global beneficiaries**?
- Which are the most human-**pressured** pixels, areas?
- Which are the most human-**threatened** pixels, areas?
- Which areas are the **top conservation priority areas**?
- Which areas are the **top human development priority areas**?
- What are reasonable **land use change projections** & what might be the **impacts** of these on ecosystem services?
- How does changing user-**prioritisation** of conservation drivers and (non-economic) **valuation** of ecosystem services change conservation priorities?
- **V3:** What are the values provided by ecosystem services to individual, regional and national GDP and how do they trade-off with developed land use?

Aichi 2020 target protected area planning

Mapping ecosystem services for PES
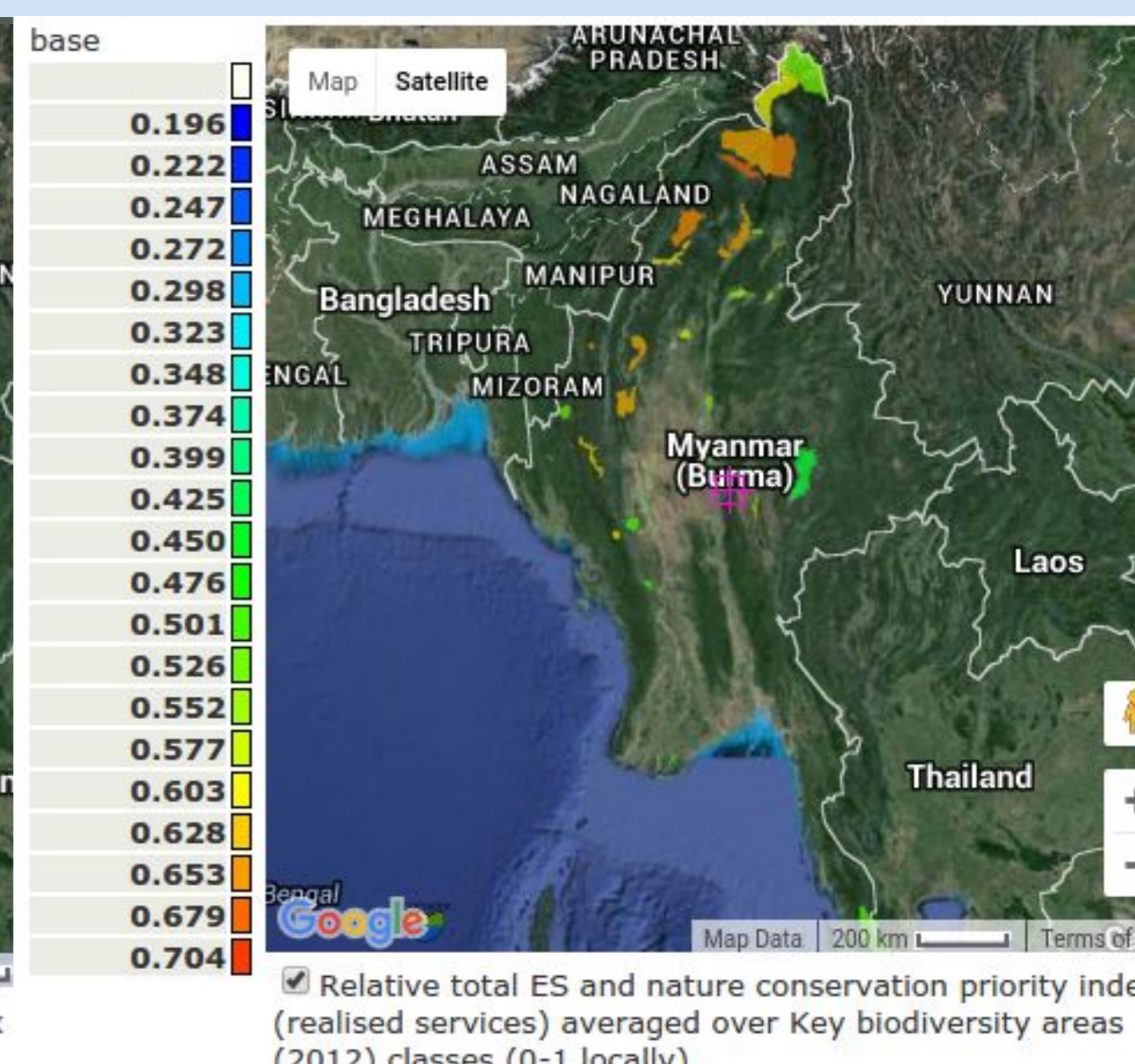
Conservation priority of existing conservation units

Users and uses of Co$tingNature

Co$tingNature
- >3500 org's in 183 countries.
- 48 user written usage cases at blog.policysupport.org

Conducting analyses here at national scale:

...and here at the local scale:

Organisations with the most registered users:

"Questions you would like to ask of these systems?" (508 responses)

Links to:
- **WaterWorld** (water: resources, security, management, ecosystem services)
- **MENARA** (a spatial SWOT [strengths, weaknesses, opportunities, threats] analysis for the world)
- **EcoActuary** (A catastrophe model focusing on the insurance value of nature-based mitigation and asset based adaptation)

Policy Support Systems

Using Co$tingNature v3.0

Define area > Prepare data > Edit valuation matrix > Run baseline > Examine mapped and total economic value (TEV) > Change valuation strategy or run scenario for land use or infrastructural intervention > Examine economic impacts and trade-offs

Step 1: Define area

Step 2: Prepare data

Step 2: Complete valuation coefficients for each service
- Easiest to focus on **use** values only
- Decide whether value should not accrue for protected areas because of use restrictions (eg timber, carbon)
- Where the realizable value needs to be constrained to that which is feasible, set a study area max. attainable value eg for REDD+ investment

Step 3: Start simulation

Step 5: Results maps

Shows values for individual services, services realised by different beneficiaries and total economic value (TEV)

Example output maps:

Total economic value (USD/km²)
Total: 1.44b USD (currently realisable on 2.24b USD [2016] GDP)

Greatest service value per pixel

Co$tingNature provides anyone with sophisticated spatial decision support towards the Sustainable Development Goals
Other ecosystem service valuation tools are available and you should always use as many as useful and feasible for your application.