CHAPTER 3

RESULTS (THEMATIC MAPS)

3.1 RESULTS OF PHASE 1: 2000 BASELINE

The results of the WISDOM process included databases on woody biomass potentials and woodfuel consumption, and a series of thematic maps resulting from the development of the Demand, Supply and Integration modules.

3.1.1 Supply module results

The set of data and parameters related to woody biomass density and productivity are summarized in Annex 2.

The maps resulting from the Supply module have a resolution of 30 arc-sec (raster maps with pixels of approximately 0.9 x 0.9 km) and concern the distribution of woody biomass stocking (Figure 24) and of potential annual productivity available for energy uses (Figure 25).

3.1.2 Demand module results

The set of data and parameters related to woodfuel consumption are summarized in Annex 4.

The maps resulting from the Demand module also have a resolution of 30 arc-sec and show the spatial distribution of woodfuel consumption by all sectors (household, industrial, commercial, etc.) in three geographical categories:

- Rural areas with population density <2000 inhabitant/km² (rural sparse).
- Rural areas with population density >2000 inhabitant/km² (rural settlements).
- Urban areas.

Figure 26 presents the spatial distribution of total woodfuel consumption resulting from the aggregation of the three layers.

3.1.3 Integration moule results

Woodfuel supply/demand balance

The maps resulting from the Integration module report, for each 30 arc-sec pixel, the balance between the consumption of woodfuels and potential sustainable supply in the 81 pixels formed by the 9 x 9 pixels cluster having the given pixel at the centre. Thus, the balance refers not to the resources within each pixel but to the area that is within 4 km from the central pixel, which may be considered the resource horizon accessible to poor households that depend prevalently on fuelwood gathering.

Two geographical representations were made:

- Original 30 arc-sec raster maps. This data set is presented at global level (Figure 27) as well as at national level (Figures 28 to 34).

- Sub-national aggregation of pixel-level balance results for a total of 655 sub-national administrative units (Figure 35).

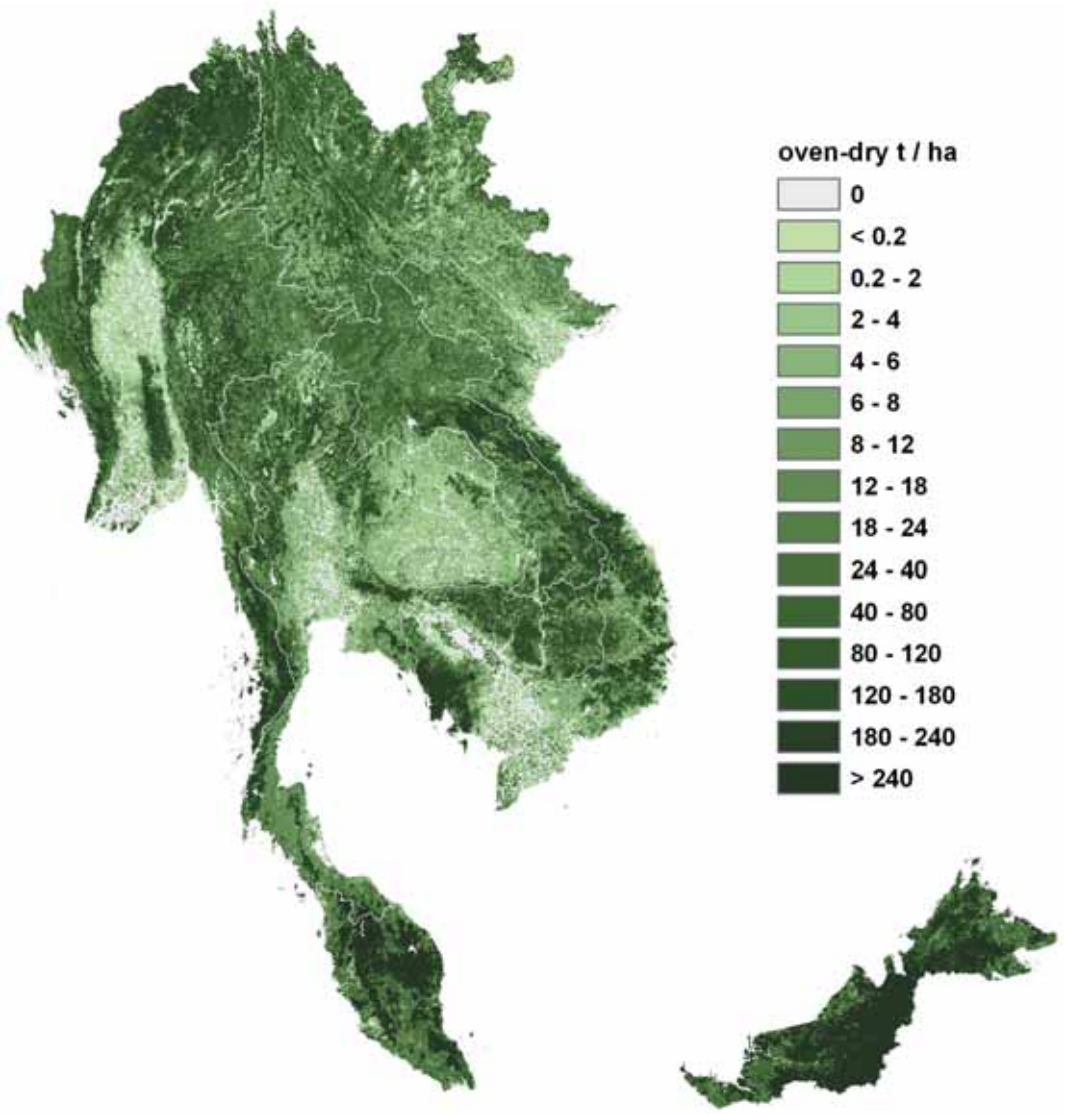
Woodfuel balance and poverty

The best available sub-national indicators related to poverty were merged into a single layer in order to create a fairly consistent subregional map (Figure 36).

The combination of the map of supply/demand balance with that of malnutrition/vulnerability allowed stratification of the area as well as the population, reflecting the interaction of both factors, and enabled identification of priority areas and populations facing at the same time acute supply shortages and critical poverty conditions. Figure 37 shows the results of the combination of woodfuel supply/demand balance and poverty categories. Country statistics on population vulnerability due to the concomitance of various woodfuel and poverty conditions are presented in Annex 6.

FIGURE 24

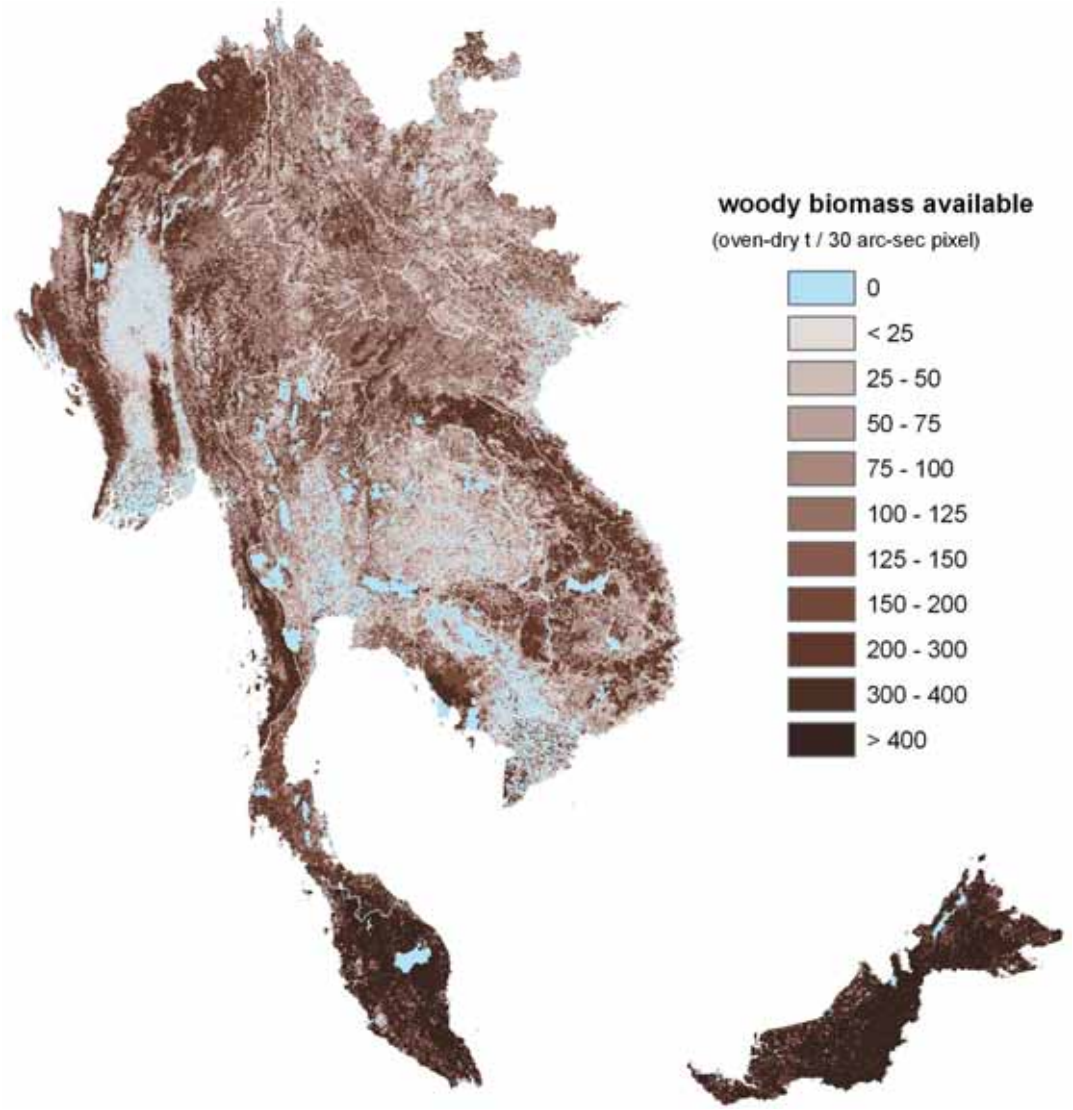
Supply module – Spatial distribution of woody biomass resources. Distribution of woody biomass stocking in 2000 at 30 arc-sec resolution (~0.9 x 0.9 km). For methodology, see Section 2.2.2



Map: wfbio_stock05.grid

FIGURE 25

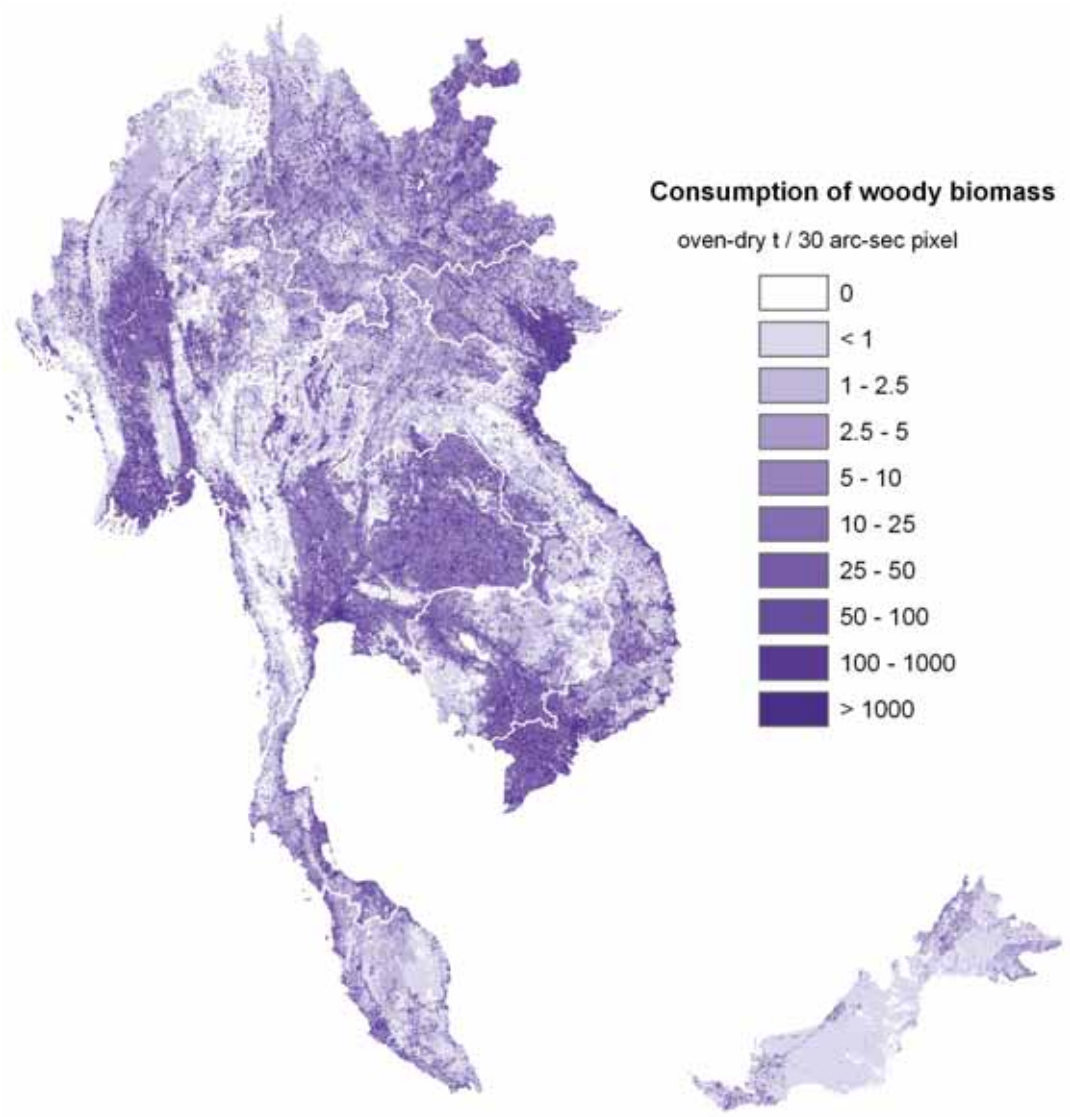
Supply module – Spatial distribution of woody biomass resources. Distribution of potential annual increment of woody biomass in 2000 at 30 arc-sec resolution (~0.9 x 0.9 km). For methodology, see Section 2.2.2



Map: wf_kg_avail06.grid

FIGURE 26

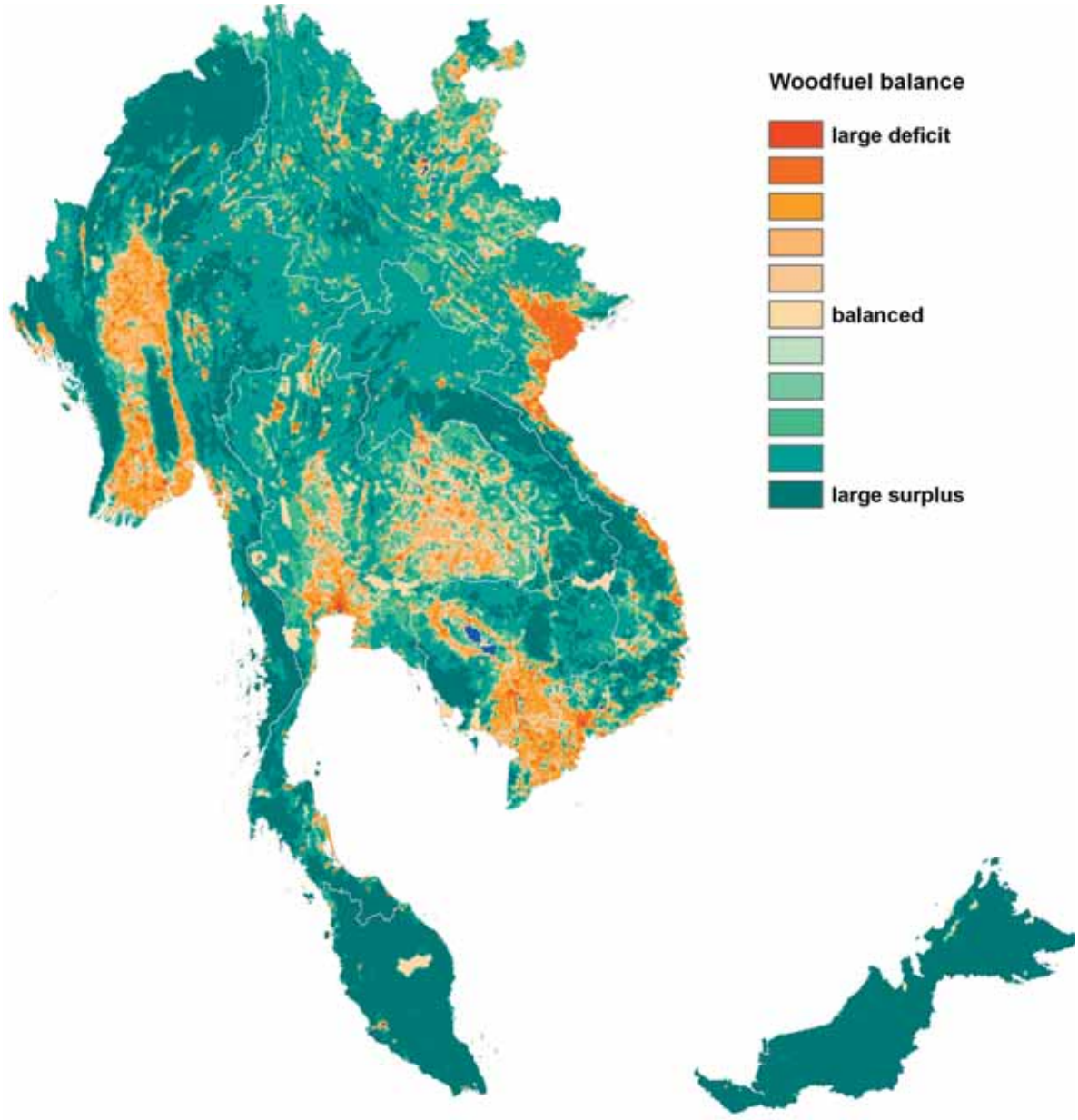
Demand module – Spatial distribution of woodfuel consumption in 2000 at 30 arc-sec resolution (~0.9 x 0.9 km). For methodology, see Section 2.2.3



Map: kgtot.grid

FIGURE 27

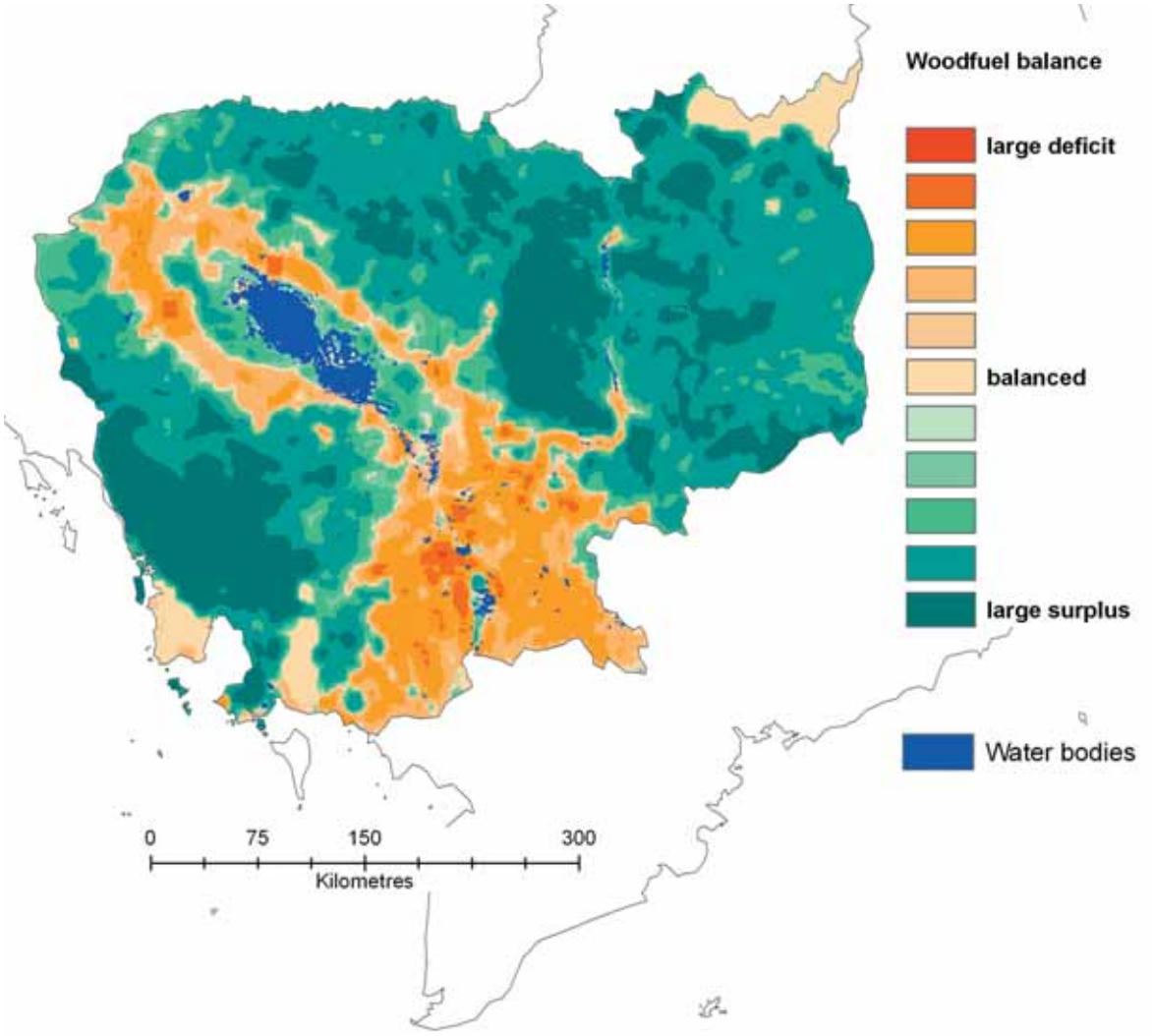
Integration module – Demand/supply balance and poverty based on 30 arc-sec data set. Map of pixel-level balance categories in 2000 – Subregional overview. For methodology, see Section 2.2.4.1



Map: f9_bal.grid

FIGURE 28

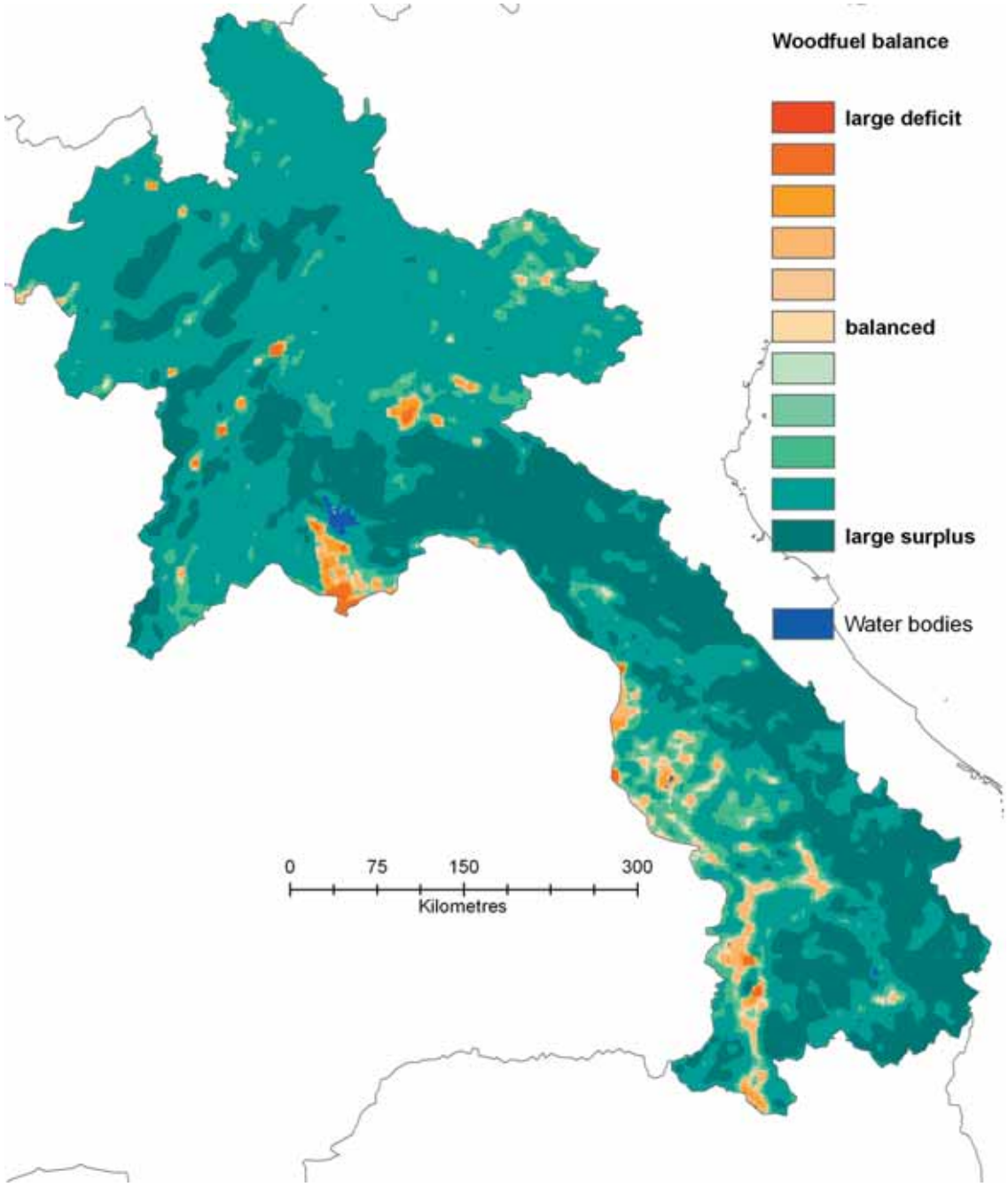
Integration module – Demand/supply balance and poverty based on 30 arc-sec data set. Map of pixel-level balance categories in 2000 – National data set for Cambodia. For methodology, see Section 2.2.4.1



Map: Cam_f9_bal.grid

FIGURE 29

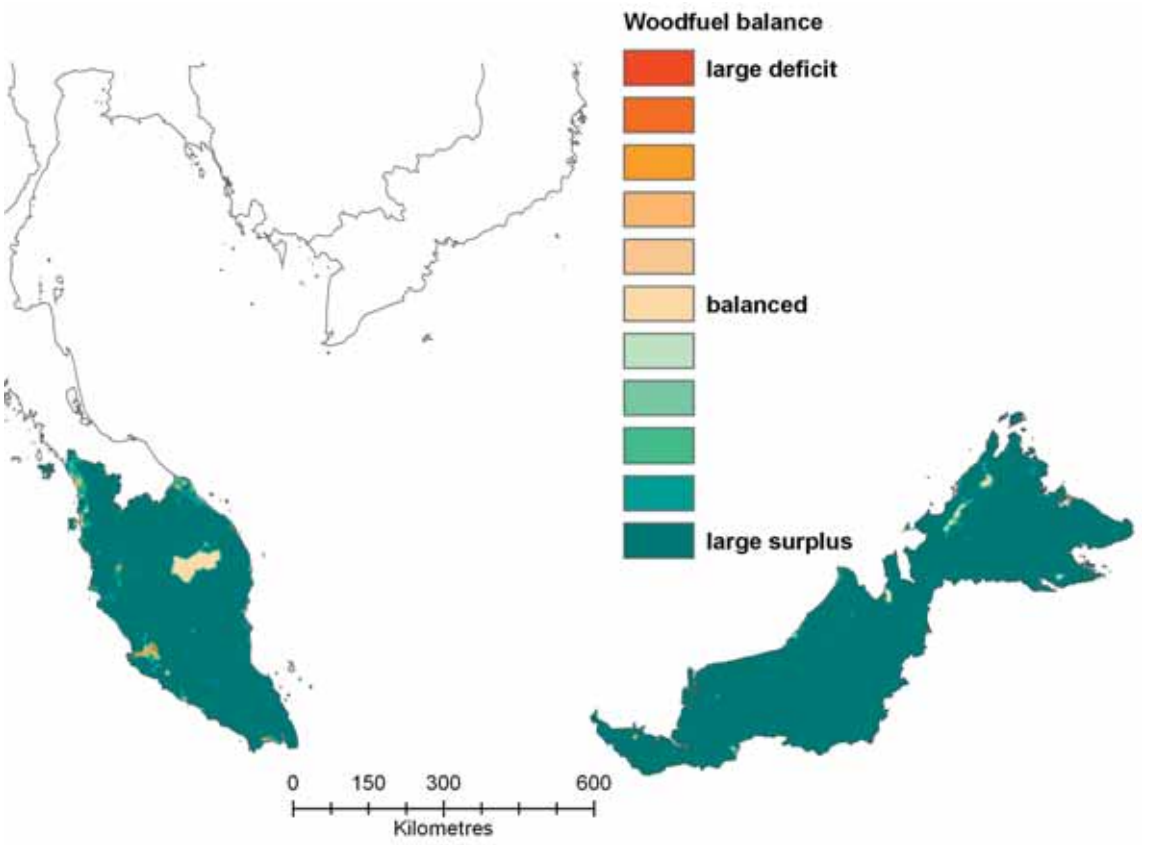
Integration module – Demand/supply balance and poverty based on 30 arc-sec data set. Map of pixel-level balance categories in 2000 – National data set for Lao PDR. For methodology, see Section 2.2.4.1



Map: Lao_f9_bal.grid

FIGURE 30

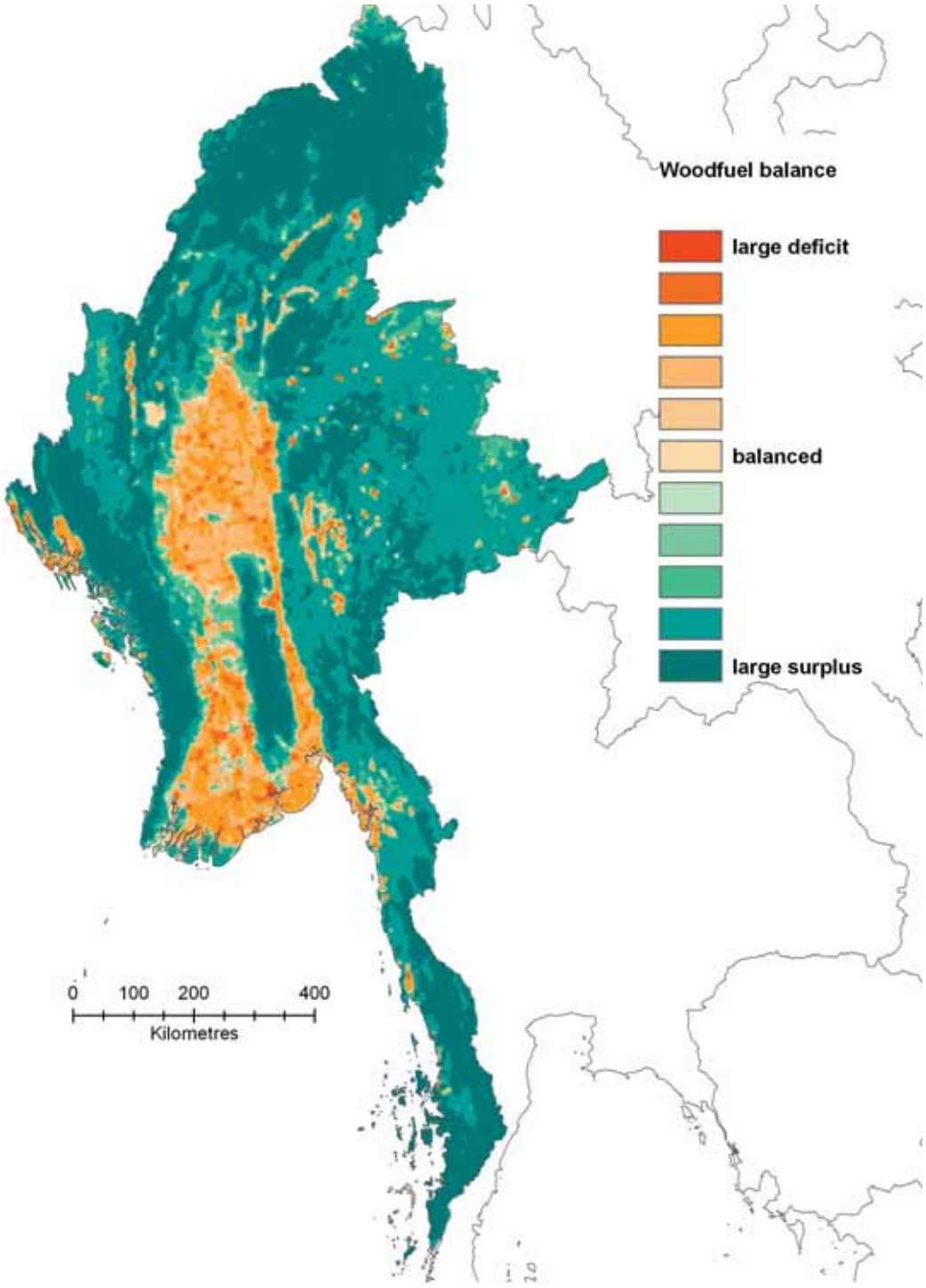
Integration module – Demand/supply balance and poverty based on 30 arc-sec data set. Map of pixel-level balance categories in 2000 – National data set for Malaysia. For methodology, see Section 2.2.4.1



Map: Mal_f9_bal.grid

FIGURE 31

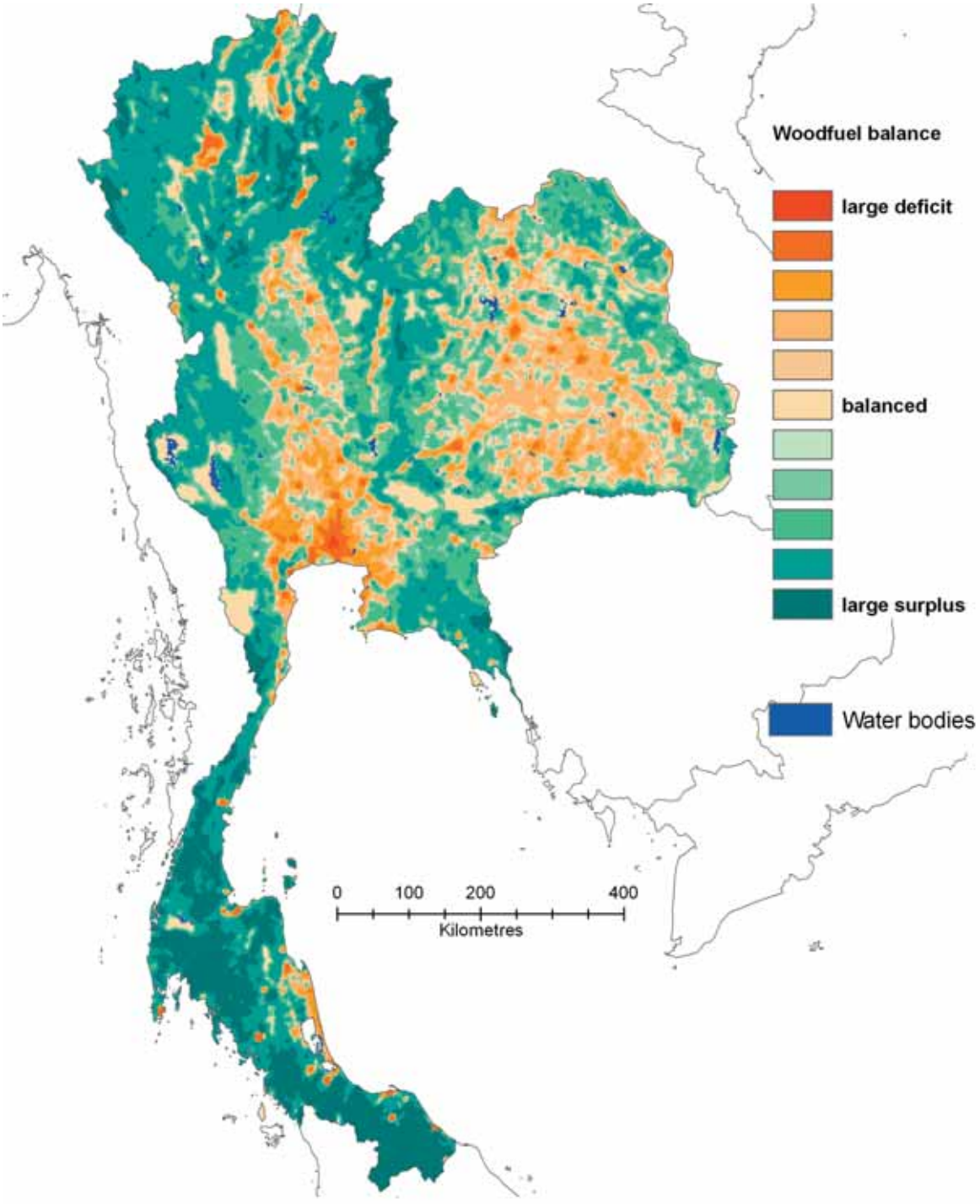
Integration module – Demand/supply balance and poverty based on 30 arc-sec data set. Map of pixel-level balance categories in 2000 – National data set for Myanmar. For methodology, see Section 2.2.4.1



Map: Mya_f9_bal.grid

FIGURE 32

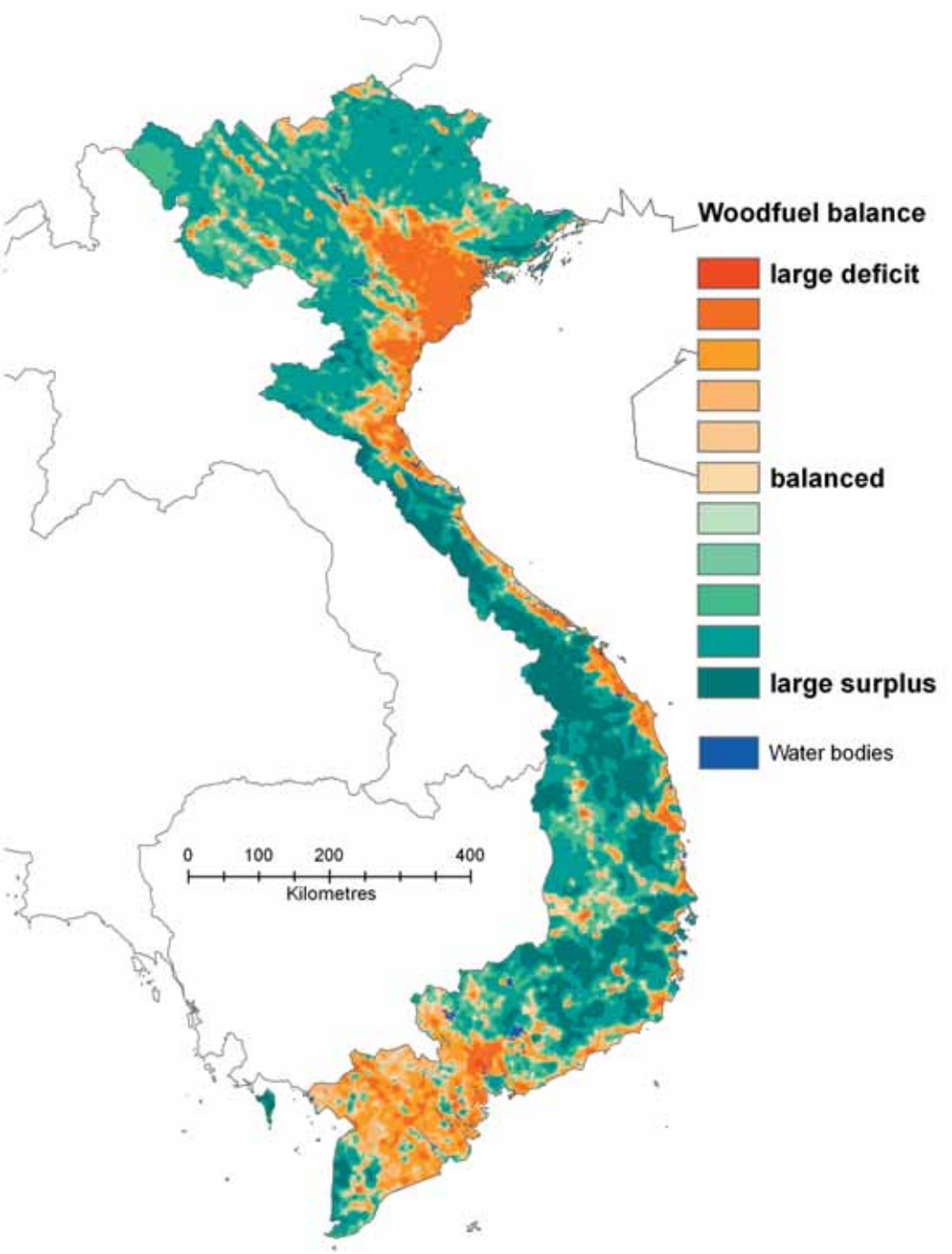
Integration module – Demand/supply balance and poverty based on 30 arc-sec data set. Map of pixel-level balance categories in 2000 – National data set for Thailand. For methodology, see Section 2.2.4.1



Map: Tha_f9_bal.grid

FIGURE 33

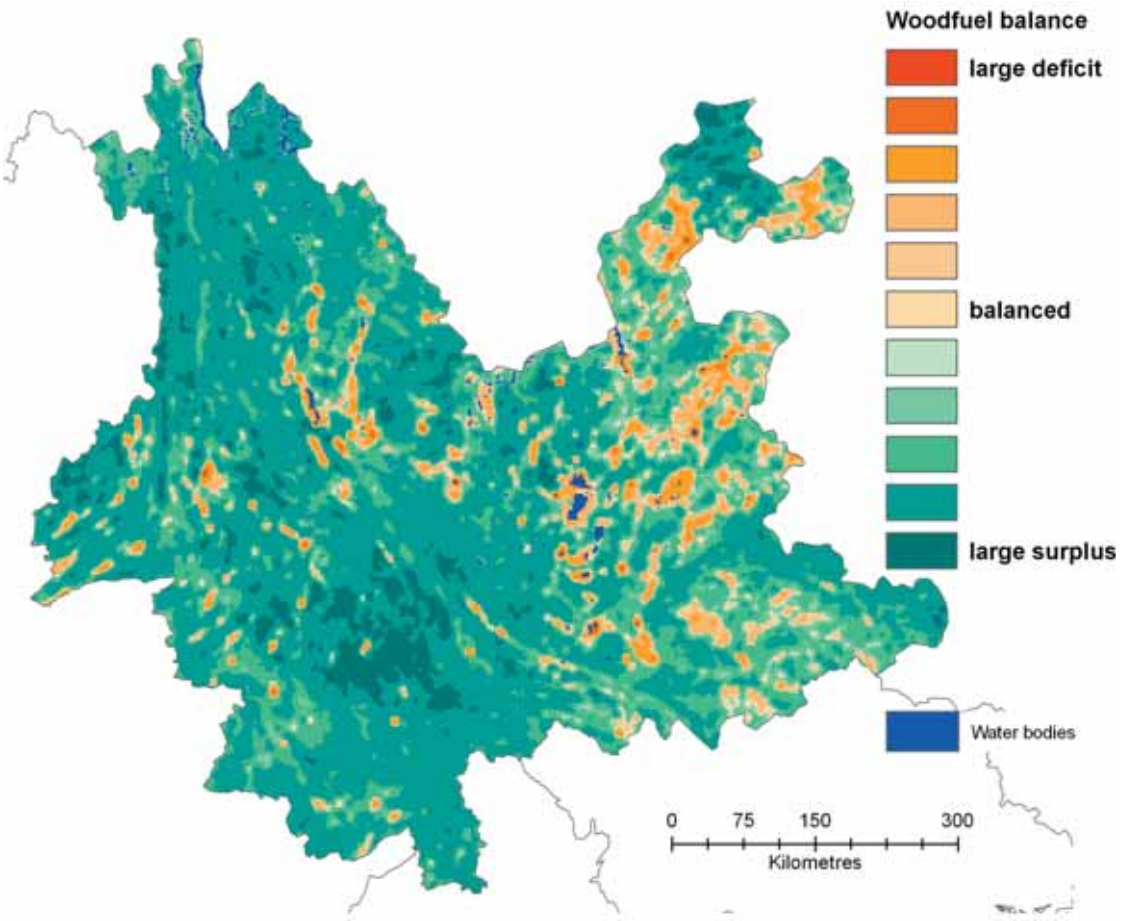
Integration module – Demand/supply balance and poverty based on 30 arc-sec data set. Map of pixel-level balance categories in 2000 – National data set for Viet Nam. For methodology, see Section 2.2.4.1.



Map: Vie_f9_bal.grid

FIGURE 34

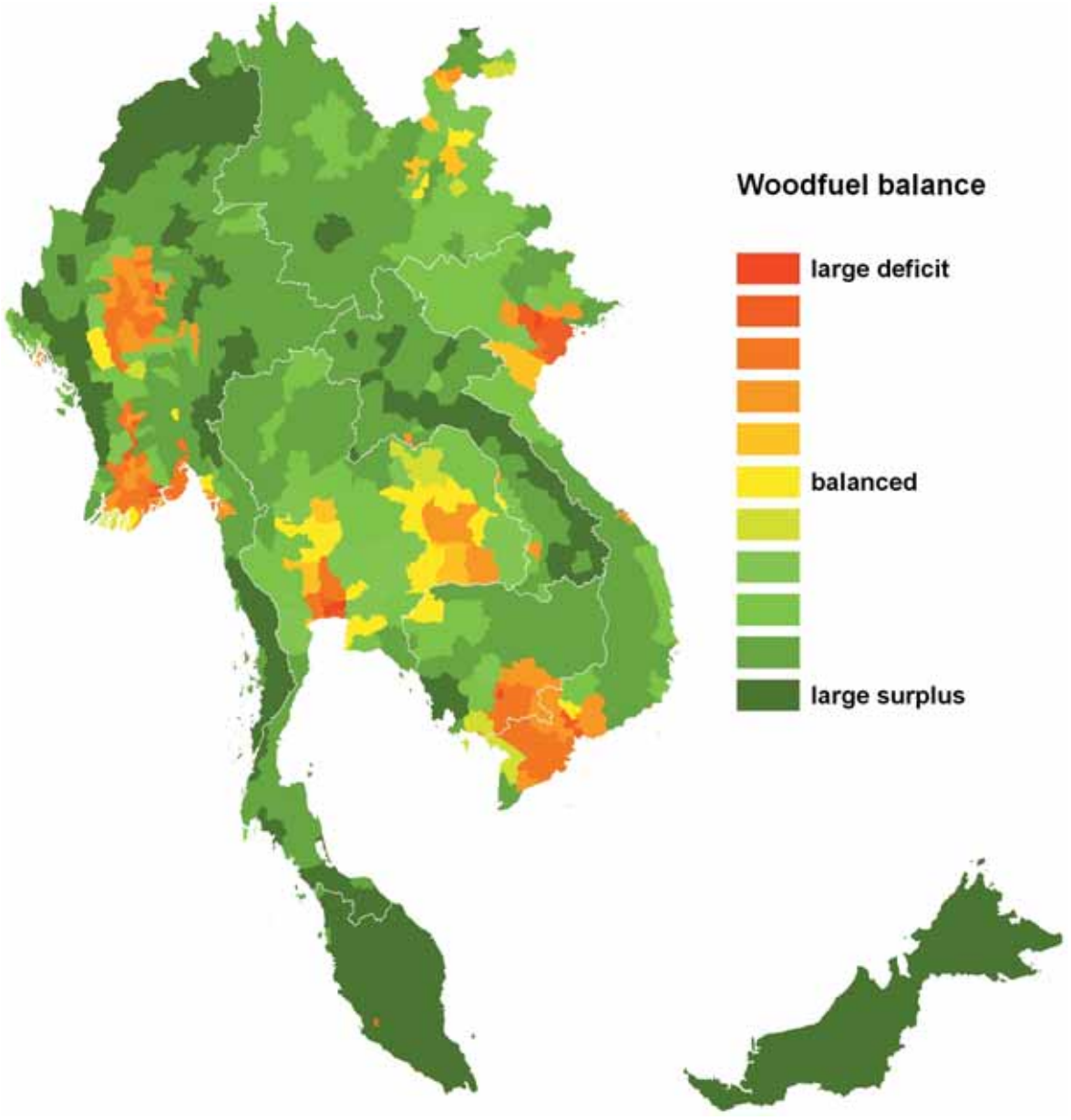
Integration module – Demand/supply balance and poverty based on 30 arc-sec data set. Map of pixel-level balance categories in 2000 – National data set for Yunnan Province, China. For methodology, see Section 2.2.4.1.



Map: Yun_f9_bal.grid

FIGURE 35

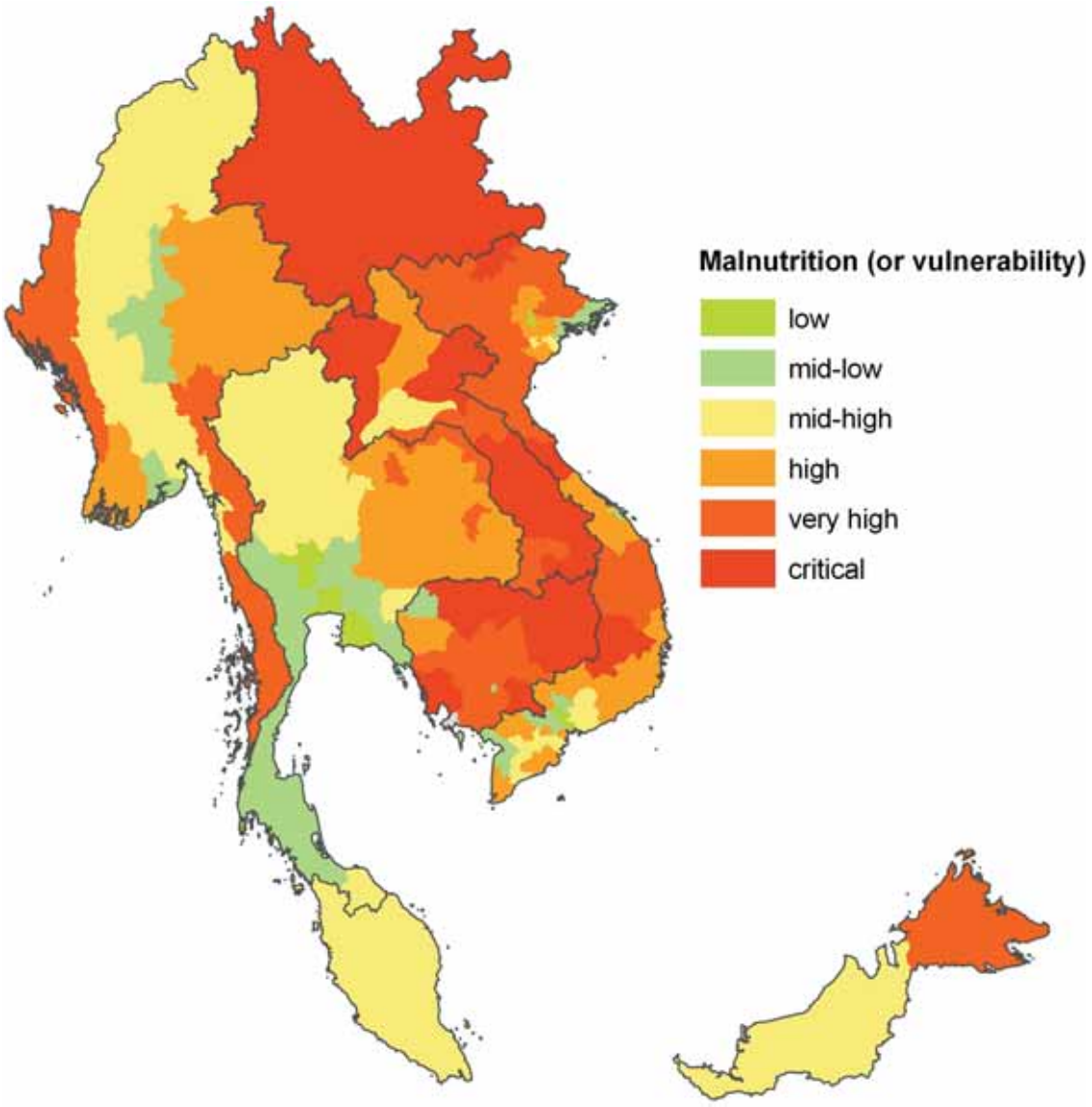
Supply/demand balance by sub-national administrative units. Year 2000. For methodology, see Section 2.2.4.3



Map: asiacover_subnational.shp
Attribute: BAL_ADMIX

FIGURE 36

Map of poverty based on best available indicators by sub-national administrative units. For description, see Section 2.2.4.4



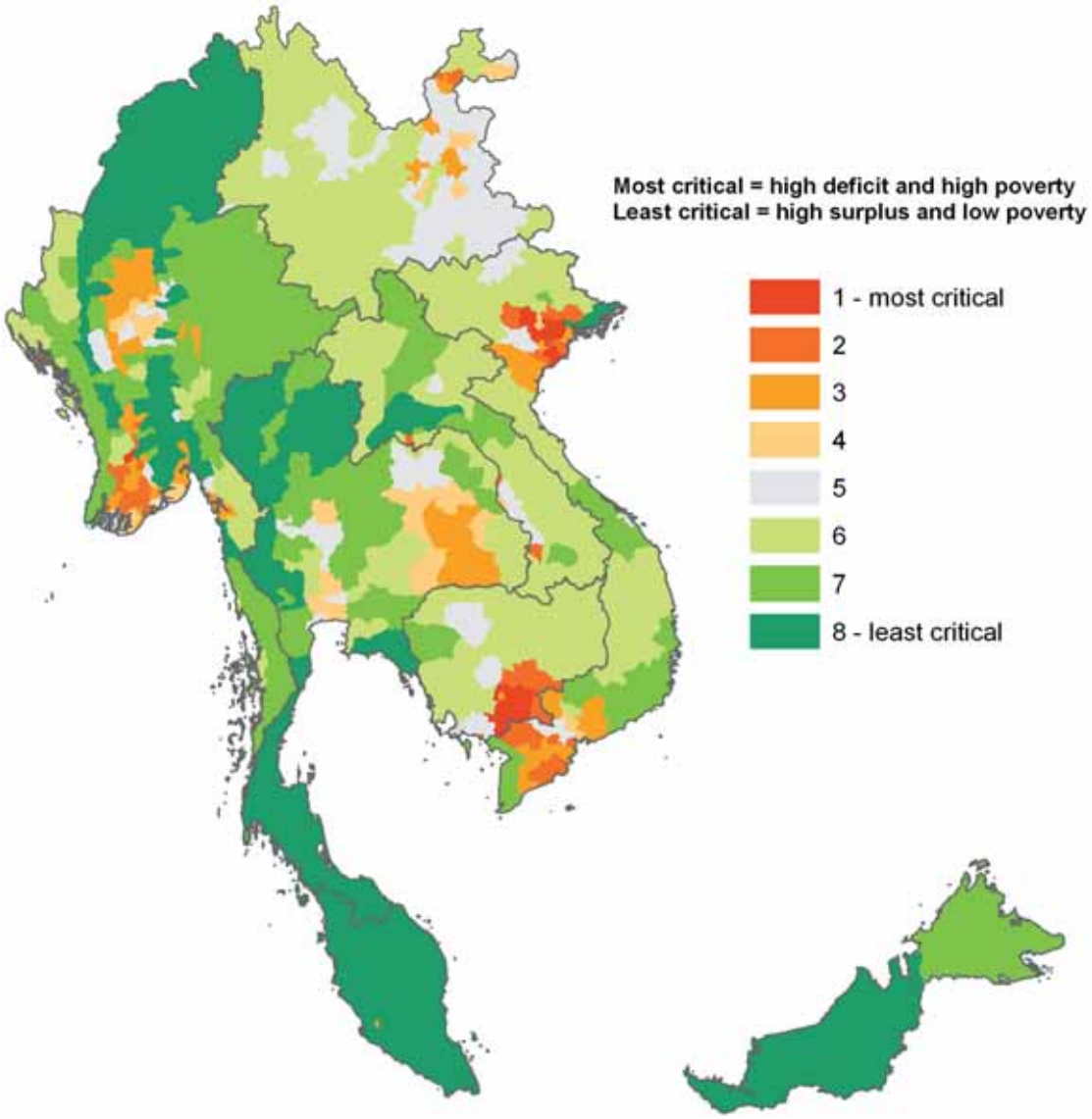
Map: asiacover_subnational.shp
Field: P_prox_sd

Malnutrition:
Stunting: Yunnan, Myanmar, Lao DPR, Vietnam, Cambodia
Underweight: Malaysia
Sources: FAO SDRN; Asia FIVIMS

Vulnerability based on multiple criteria (Thailand only)
Source: Asia FIVIMS

FIGURE 37

Critical poverty and woodfuel conditions in 2000. For description, see Section 2.2.4.4



Map: asiacover_subnational.shp
Field: combined_r

		Malnutrition or vulnerability					
		low	mid-low	mid-high	high	very high	critical
balance		1	2	3	4	5	6
critical deficit	1	4	3	2	1	1	1
very high deficit	2	4	3	2	1	1	1
high deficit	3	5	4	3	2	1	1
medium deficit	4	5	5	3	3	2	2
light deficit	5	6	5	4	3	3	3
balanced	6	6	6	5	4	4	4
light surplus	7	7	7	6	5	5	4
mid-low surplus	8	7	7	7	6	5	5
mid-high surplus	9	8	8	7	7	6	5
high surplus	10	8	8	8	7	6	6
very high surplus	11	8	8	8	7	7	6

3.2 RESULTS OF PHASE 2: 2015 SCENARIOS

The result of Phase 2 consists of a series of thematic maps, at 30 arc-sec resolution, depicting potential situations in 2015 in terms of woody biomass supply potentials, likely woodfuel consumption levels and the combination of these two to predict possible supply/demand balance scenarios.

3.2.1 2015 supply potential

The results of the supply 2015 module include maps of total woody biomass stocking and maps of estimated productivity levels potentially available for energy use after deductions reflecting access restrictions in protected areas, and after deduction of the woody biomass needed for non-energy uses predicted in 2015. In order to account for the high variability in reference data on stocking and mean annual increment, three situations were considered: a mean productivity variant (most likely condition); a minimum productivity variant; and a maximum productivity variant. The difference between the predicted supply potential in 2015 and the 2000 baseline, limited to the mean productivity variant, is also shown. Amidst a general decrease due to deforestation and forest degradation processes, the map shows an increase in Yunnan as result of extensive natural and man-made forestation processes, and a reduction in Malaysia due to the predicted high industrial roundwood production and hence the comparatively lower resource available for energy uses. Figure 38 shows the distribution of woody biomass potentially available for energy use in 2015 according to the mean, minimum and maximum productivity variants.

3.2.1 2015 demand scenarios

The woodfuel consumption in 2015 was predicted assuming two basic scenarios: one based on the consumption trends estimated by the GFPOS model (GFPOS-trend scenario), and another one based on the assumption that the 2000 per capita woodfuels consumptions in rural and urban areas remained basically unchanged, and change reflected population growth rates (BAU scenario). The differences between the two scenarios with respect to 2000 baseline consumption are shown in Figure 39. The main distinction is in the generalized increment of the BAU scenario as opposed to the generalized reduction for the GFPOS-trend scenario. The main exception is in Thailand, where the increment in charcoal consumption according to GFPOS trends offsets the reduction in fuelwood consumption, with a resulting increment in biomass consumption in rural areas. The results of the two scenarios, which present relatively small differences, are shown in Figure 40.

3.2.1 2015 supply/demand balance

Following the same approach as adopted in Phase 1 for mapping the 2000 situation, the analysis was conducted at pixel level, but not in isolation, by considering the values of the surrounding pixels. In this case, the pixels within a 5-pixel radius were used to compute pixel-level balances.

Data are presented by 30 arc-sec resolution and by sub-national administrative units:

- **30 arc-sec maps.** The maps resulting from the combination of the GFPOS-trend consumption scenario and the three supply variants are shown in Figure 41. The maps resulting from the combination of the BAU consumption scenario and the three supply variants are shown in Figure 42. Figure 43 shows the evolution of the balance from the 2000 baseline according to the two scenarios, where the aspects of Yunnan and Malaysia described above are clearly visible.
- **Administrative-unit maps.** Sub-national aggregation of pixel-level balances was done for 655 sub-national administrative units. The maps resulting from the combination of the two consumption scenarios and the mean productivity variant are shown in Figure 44.

Population distribution by balance categories

Statistics reporting the distribution of population by different balance situations were computed after ranking the quantitative values into balance categories using the same thresholds as used for the 2000 analysis. The tables reporting populations (total and sparse rural only) by countries and by balance categories for all consumption scenarios and supply variants are given in Annex 9.

FIGURE 38

2015 supply potential. Predicted woody biomass availability for energy use in 2015 shown as mean, minimum and maximum productivity variants, and difference from 2000 baseline. For methodology, see Section 2.3.1

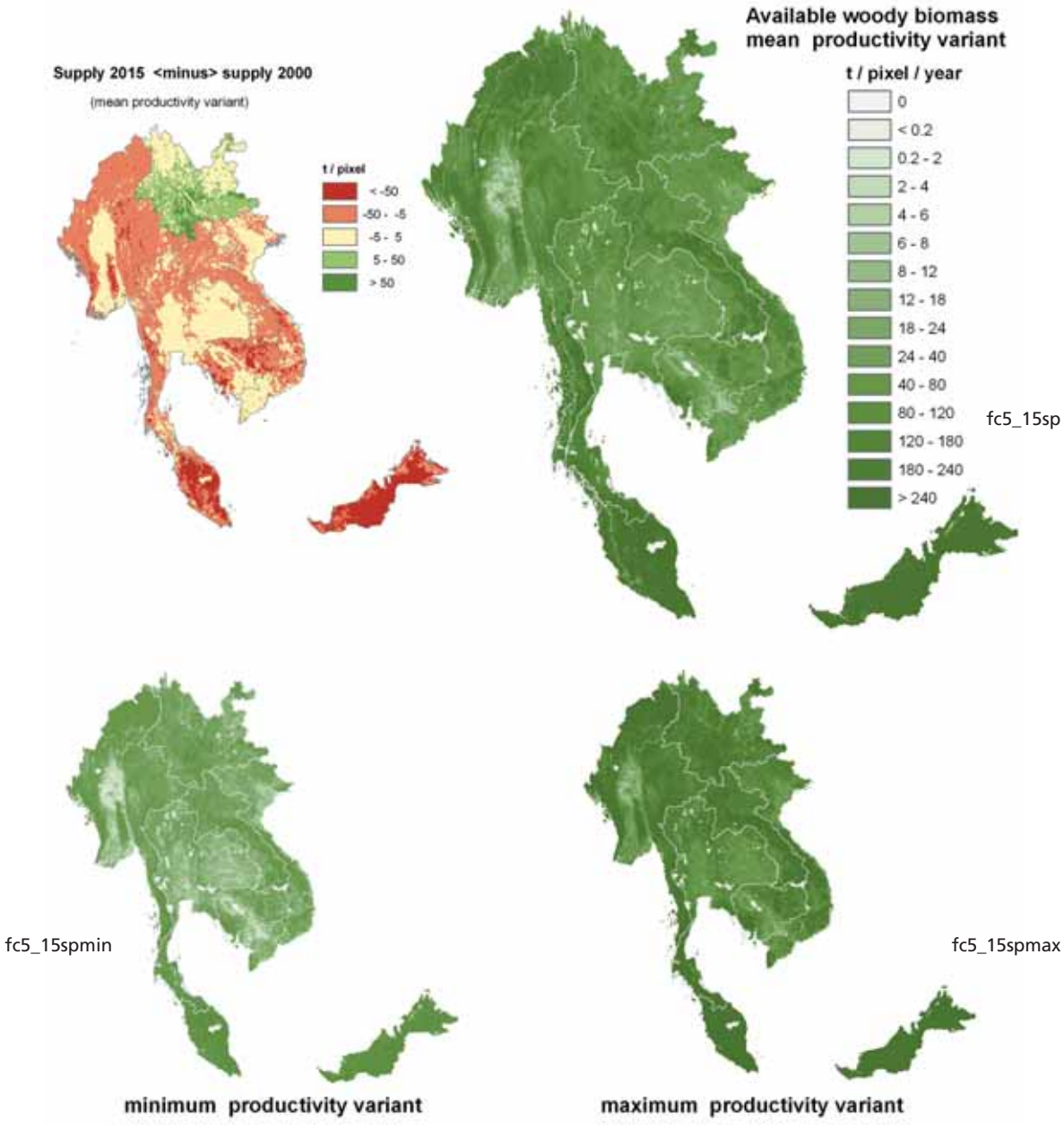


FIGURE 39

2015 demand scenarios. Changes in woodfuel consumption between 2000 and 2015. For methodology, see Section 2.3.2

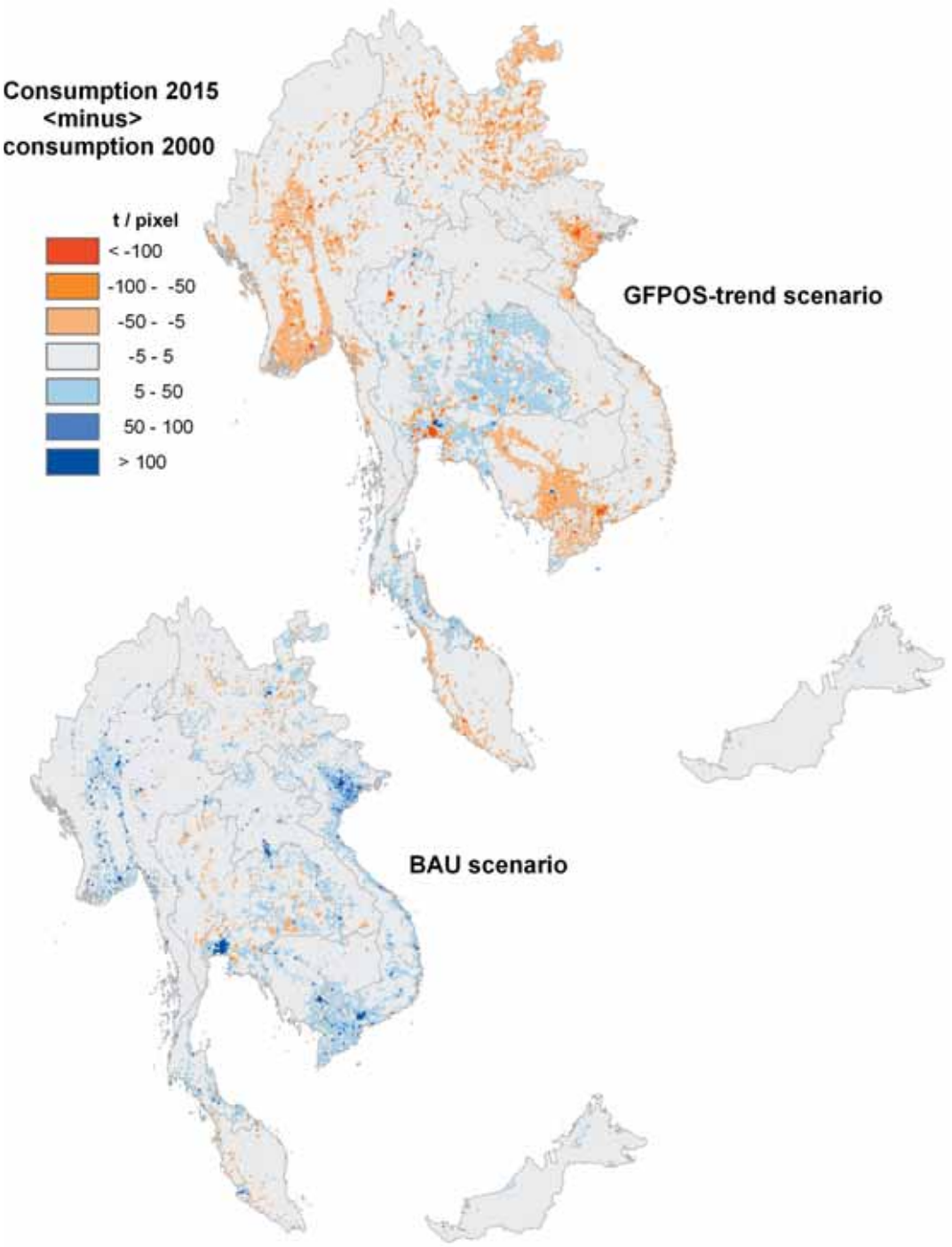


FIGURE 40

2015 demand scenarios. Predicted woodfuel consumption in 2015 for GFPOS-trend and BAU scenarios. For methodology, see Section 2.3.2

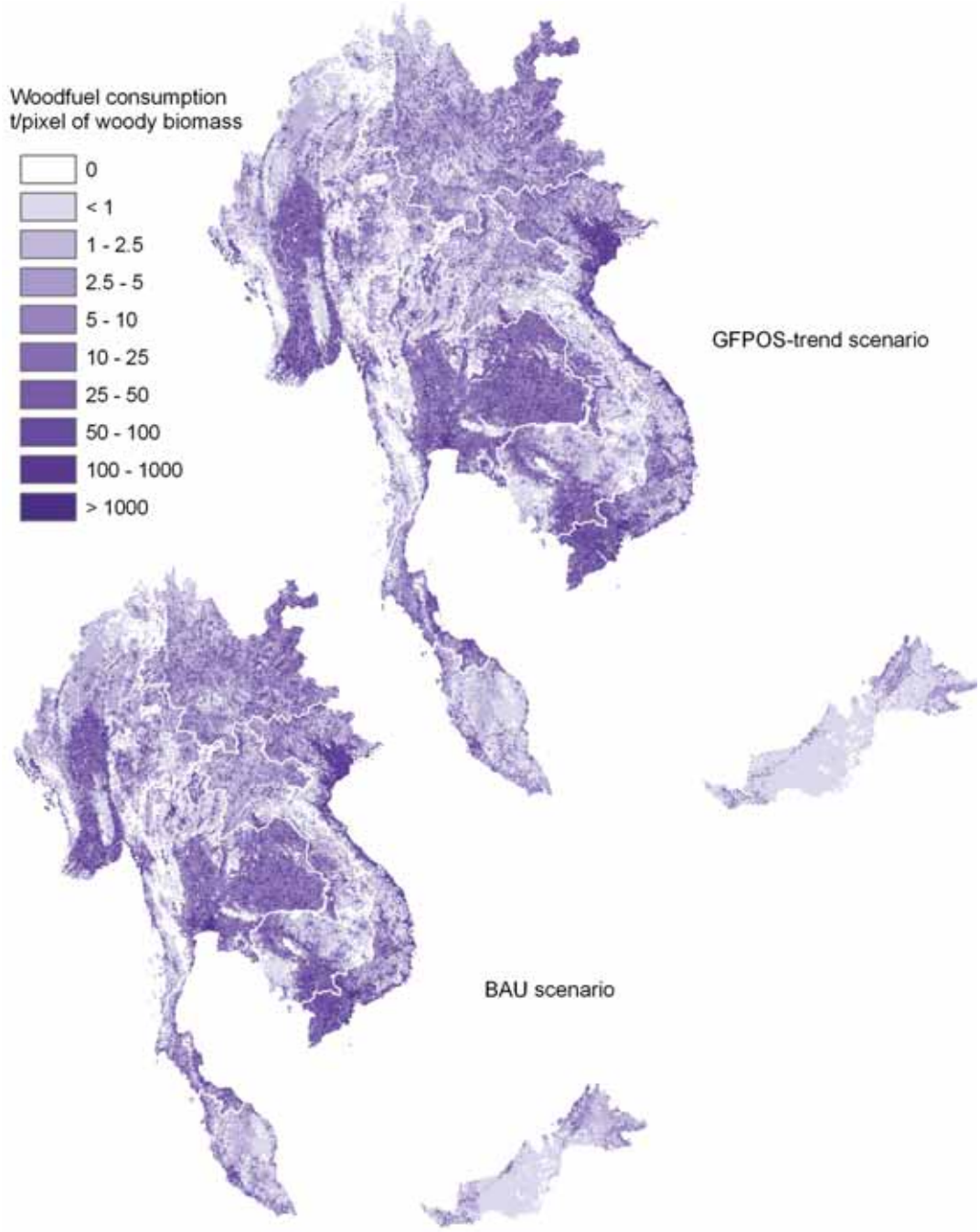


FIGURE 41

Pixel-level woodfuel supply/demand balance in 2015 for GFPOS-trend scenario – Regional level. Predicted supply/demand balance scenarios based on the 30 arc-sec data set. For methodology, see Section 2.3.3.1

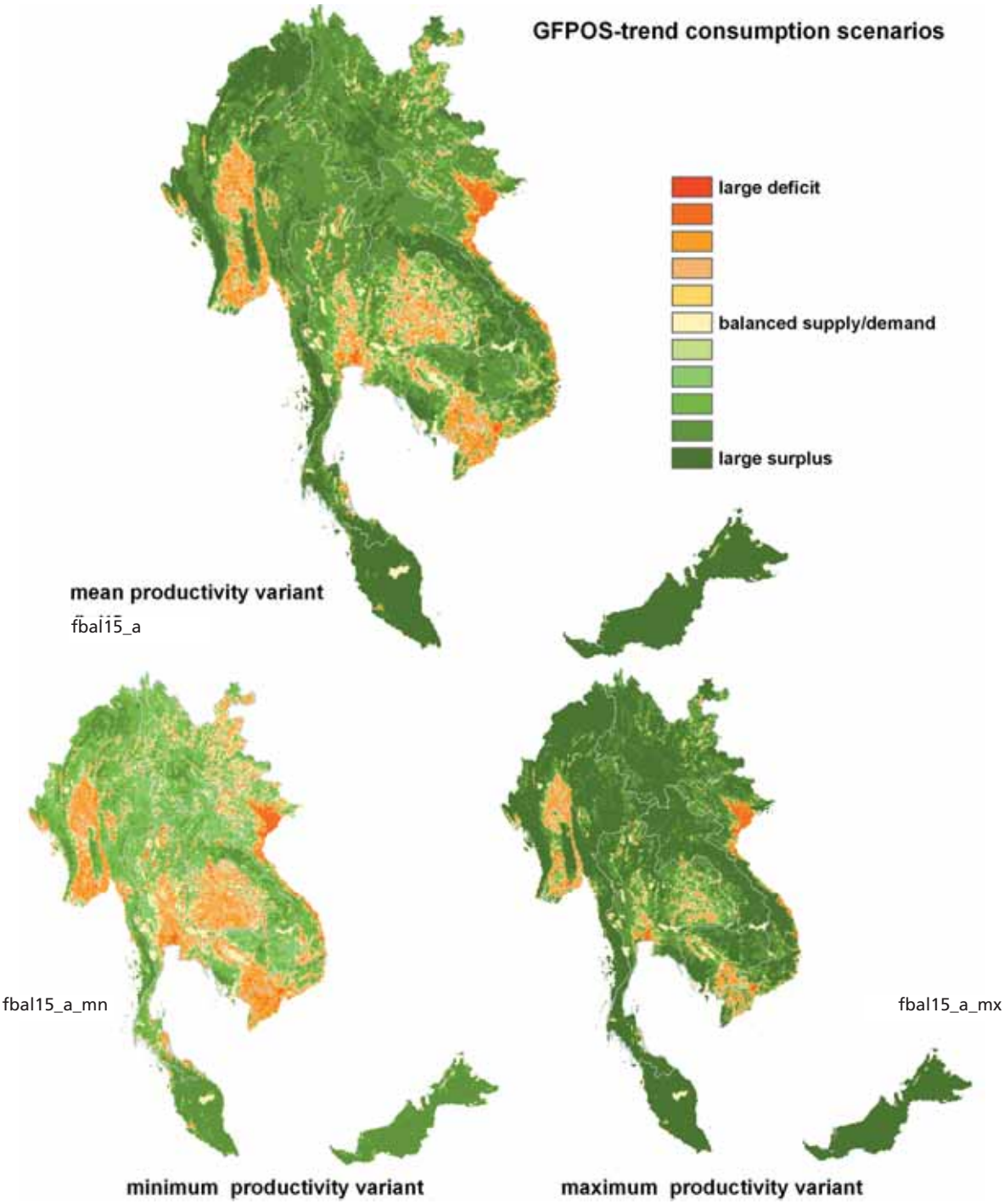


FIGURE 42

Pixel-level woodfuel supply/demand balance in 2015 for BAU scenario – Regional level. Predicted supply/demand balance scenarios based on the 30 arc-sec data set. For methodology, see Section 2.3.3.1

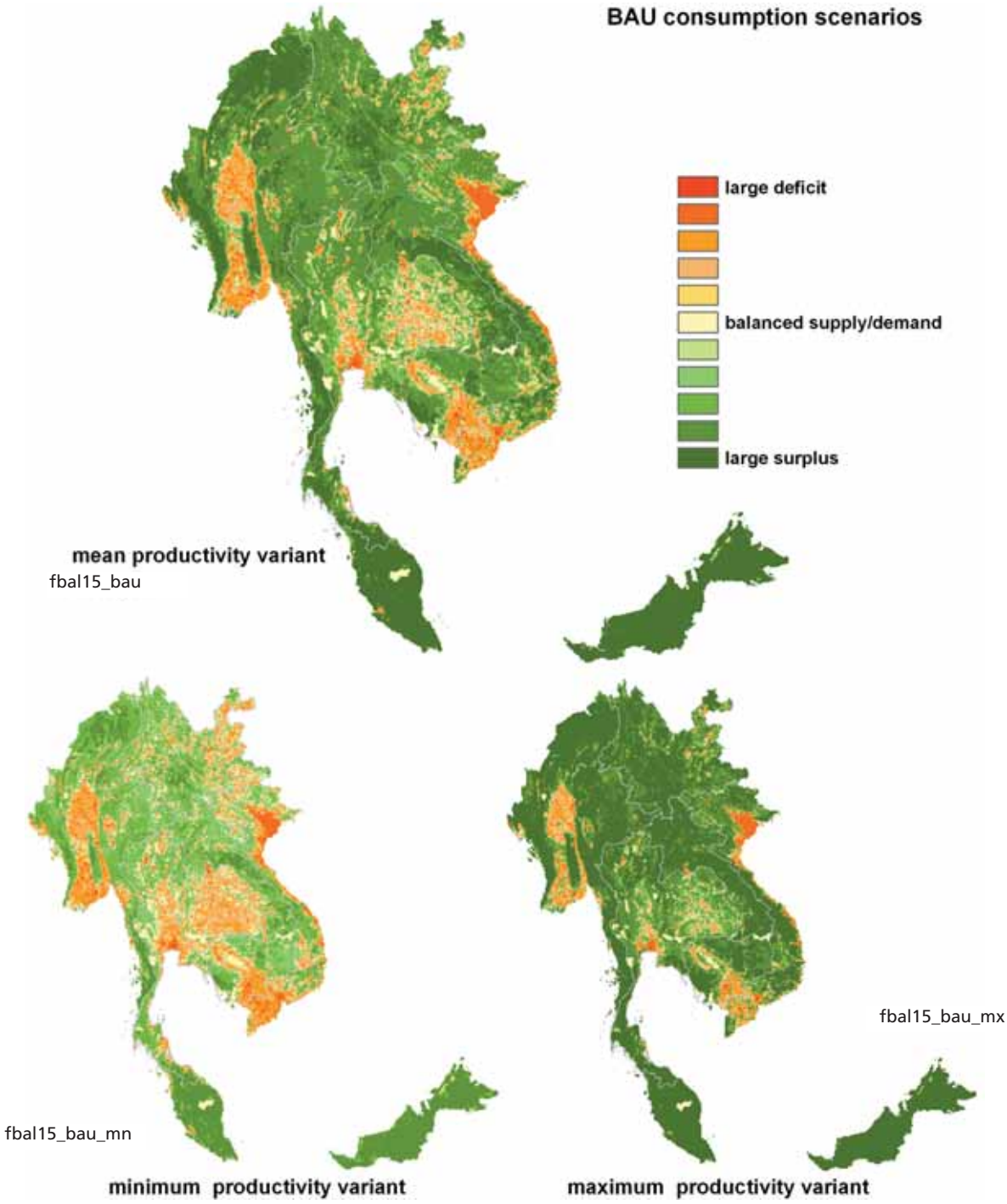


FIGURE 43

Evolution of supply/demand balance according to GFPOS-trend and BAU scenarios – Regional level. Predicted supply/demand balance scenarios based on the 30 arc-sec data set. For methodology, see Section 2.3.3.1

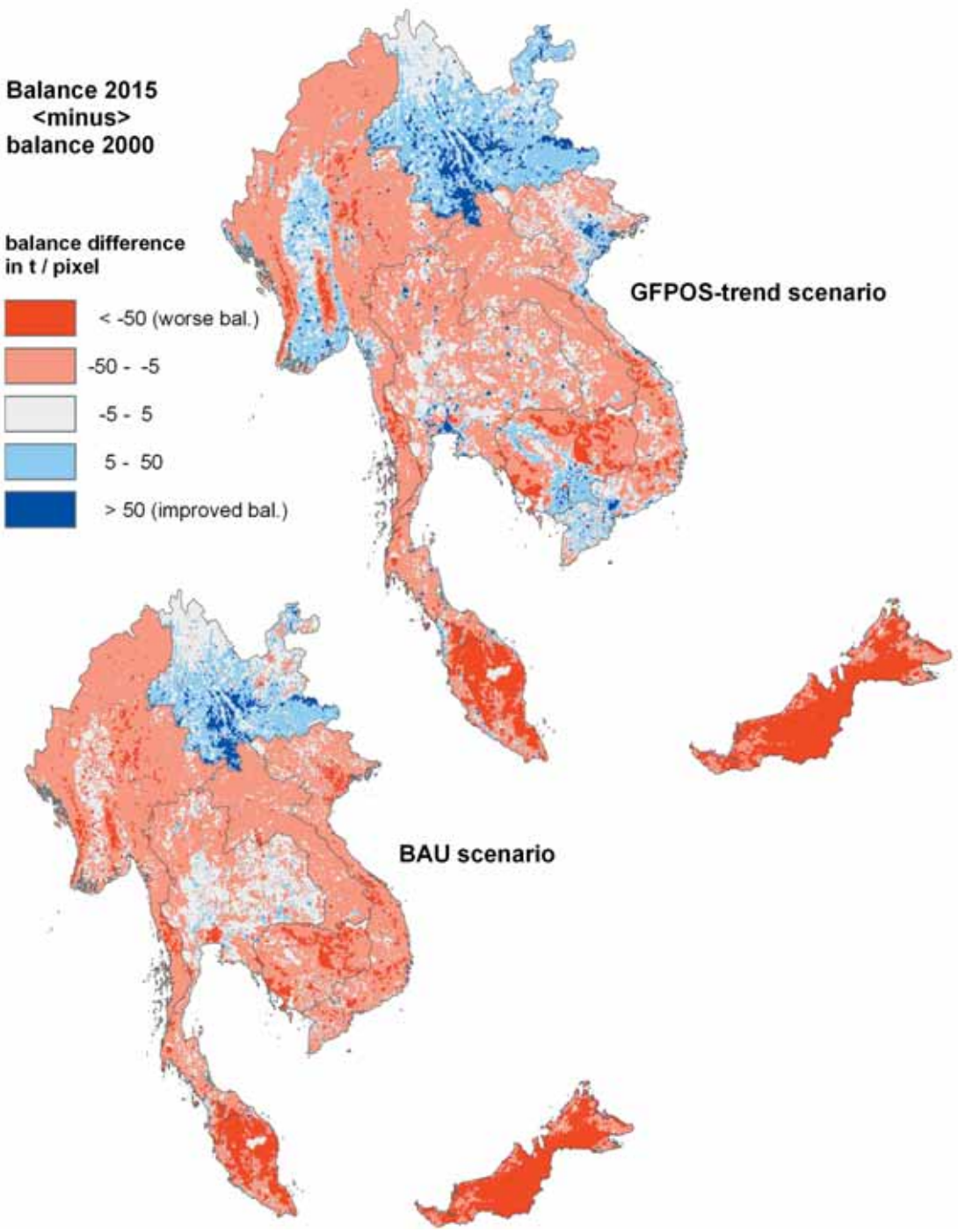


FIGURE 44

Projected 2015 supply/demand balance by sub-national administrative units for GFPOS-trend and BAU scenarios (mean productivity variant only). For methodology, see Section 2.3.3.2