The 15 photos, satellite images and land cover details show the highly diverse biogeographical characteristics and anthropogenic forms of land use in selected landscapes. This creates great potential for diverse forms of ecological and socio-economic usage.
CLIMATE:
TEMPERATURE AND PRECIPITATION

As Myanmar is located in the tropical and subtropical zone, most regions have a monsoon climate. The high mountains surrounding the country to the north, northwest and northeast prevent the entry of cold air masses from Central Asia so that tropical and subtropical air masses from the south determine temperatures and humidity levels. Four (Hla Tun Aung 2003: 99) or five seasons (Tun Lwin 2002, Ohnmar Htway/Matsumoto 2011) can be distinguished for Myanmar: the pre-monsoon season (mid-April to mid-May), the monsoon or rainy season (mid-May to mid-October), the post-monsoon season (mid-October to end-November), the dry and cool season (end-November to mid-March) and the hot season (mid-March to mid-April). The date of onset of the summer monsoon in Myanmar ‘is defined as the date of the first day of three consecutive rainy days with daily rainfall amount of 2.54 mm or more’ (Ohnmar Htway/Matsumoto 2011: 382). Usually, the summer monsoon reaches the southern parts of the country by the third week of May and the northern parts at the beginning of June (Roy/Kaur 2000: 914).

The Department of Meteorology and Hydrology (DMH) under the administration of the Ministry of Transport and Communications operates 63 meteorological, 39 meteorological and hydrological and 17 agro-meteorological stations in Myanmar, well-distributed over the country. Data and forecasts are provided to the public via television, radio, newspaper and social media channels. Based on these records the regional variations of temperature and precipitation can be analysed.

TEMPERATURES

Countrywide, the annual mean temperature ranges (with variations according to latitude, altitude and vicinity to maritime influence) between almost 30 and 15°C – e.g. Minbu with 27.5°C, Puta-O with 20.5°C and Kanpetlet with 16.3°C (all data, also in the following: WMO/FAOCLIM, FAO 2005). The monthly mean maximum and minimum daily temperatures also range widely, depending on season and elevation. In the lowlands, especially the dry zone in central Myanmar, monthly mean daily maximum temperatures between 32 and 33.5°C are characteristic of the hot and pre-monsoon season while, depending on altitude and local wind systems, the average is between 23 and 29°C. Only in the mountain areas in the north of Kachin State can monthly mean daily maximum temperatures be as low as 20°C or less. The monthly mean daily minimum temperatures range between 21.5 (in the southeast of tropical Tanintharyi Region) and 16°C in the lowlands; in the mountain regions, depending on altitude and latitude, the monthly mean daily minimum temperatures range between 18.5 and 6°C. In the mountains in northern Kachin State, monthly mean daily minimum temperatures can reach around or under freezing point in the cold season.

In the rainy season daily mean temperatures in the lowlands range between 25 and 33.5°C, while in the post-monsoon season they are between 23 and 28°C (according to latitude, altitude and annual monsoonal variation). In the mountains, depending on altitude, they reach around 20°C (lower mountains) or 16°C (higher mountains). In the cool dry season daily mean temperatures fall to between 14°C and 18°C in the lowlands, and to just above freezing in the mountains and hills. The hot and pre-monsoon seasons bring the highest temperatures in the lowlands (daily mean temperatures range between 28 and 40°C, in some locations even higher) together with high humidity, especially along the coast, with less humidity in the dry zone (Hla Tun Aung 2003). In those parts of
Myanmar which are located in the tropics, i.e. south of 23.5°N (roughly the line of latitude of Kalay, Mogok and Lashio), strong temperature fluctuations can be measured during the course of the day – this is known as the ‘diurnal climate’ (as opposed to the seasonal climate e.g. in Europe).

**PRECIPITATION**

While the area weighted average rainfall (period of 1947-1979) ranges from 1,561 mm (1956) to 2,240 mm (1961), the average is 1,790 mm (Roy/Kaur 2000: 915). August and July are the months with most rainfall. Almost 90% of the rain falls during the summer monsoon period (Ohnmar Htway/Matsumoto 2011). As the rain-bearing winds of the southwest summer monsoon cannot rise above the mountain chains along the west coast they bring intensive rainfall to the steep western mountainsides, which have Myanmar’s highest annual rainfall values with almost 5,500 mm (Maung Maung Kha 1945). A second regional maximum is observed in the southern Ayeyarwady Delta and along the southern Andaman Sea coast. Interestingly and most likely due to the orographic barrier between these areas ‘analysis indicates no significant relationship between Myanmar’s rainfall and that of Bangladesh or Northeast India’ (Roy/Kaur 2000: 921). The same holds true for little correlation between the annual monsoon rainfalls of India and Myanmar (Kripalani/Kulkarni 1998, Roy/Kaur 2000: 921).

The amounts of mean annual rainfall received are highest at Dawai (5,637 mm), Thandwe (5,537 mm), Mawlamyine (4,958 mm) and Sittwe (4,209 mm) along the coast and Puta-O in the north (4,058 mm). The Ayeyarwady Delta receives slightly less rainfall at Pathein (2,772 mm), Yangon (2,392 mm) and Tharrawaddy (2,261 mm). Mountain and hilly regions such as in Chin and Kachin States and the Shan Highlands also experience high rainfall values due to the orographic effect, e.g. Taunggyi (1,747 mm), Falam (1,642 mm), Lashio (1,572 mm) and Kengtung (1,103 mm) (for different data see Khin Khin Han 2016). The higher elevations above 3,500 m in Kachin State can be subject to snowfall during the cold season from November to February. The dry zone in Myanmar’s interior – in the lee of the coastal mountain ranges – is protected from the monsoon rainfall; thus the values range between 400 and 1,000 mm per annum with high evaporation rates, e.g. for Mandalay (858 mm), Monywa (831 mm) and Meiktila (820 mm). The fringe area of the dry zone receives slightly more rain, e.g. in Pyinmana (1,305 mm) (further and different data see Khin Khin Han 2016). Precipitation rates also seldom exceed 2,000 mm per annum in the Shan Hills.

Rainfall variability, i.e. the temporal and areal variability of precipitation, differs within Myanmar. The lowest variability is observed at Puta-O, the eastern highlands, the coastal areas of the Ayeyarwady Delta and the coastal strip of Tanintharyi Region, with a value of 10 to 15 per cent; rainfall variability is also low towards the southern part of the country (Khin Khin Han 2016). Central Myanmar has more rainfall variation than other parts of the country: the middle part of the Sagaing Region, the western part of Magway Region and the Mandalay Region experience variation from 20 to 25 per cent. Pa-kokku has the highest variation at 38 per cent.

**Frauke Kraas and Khin Khin Han**
Temperature

Temperature (°C)
(monthly mean maximum daily)

Temperature (°C)
(monthly mean minimum daily)