RICE AREA AND PRODUCTION ESTIMATES FOR THE 2023 SUMMER SEASON

This report represents the latest findings of the Asian Disaster Preparedness Center's (ADPC) rice mapping initiative, which includes mapping and analyzing rice cultivation in Myanmar during both the monsoon and post-monsoon (summer) seasons. Specifically, this report focuses on the summer 2023 rice cultivation season and covers the primary states and regions known for summer rice production, namely Ayeyarwady, Bago, Magway, Mandalay, Mon, Sagaing, Shan, and Yangon. This work aims to contribute to a comprehensive understanding of rice cultivation in Myanmar to facilitate climate resilience, targeted humanitarian support needs, and data-driven decision-making in the country's agricultural sector.

Key Findings

Impact of Climate Events: The summer season of 2023 faced climatic challenges, including a cyclone and a trend of decreasing rainfall. Cyclone Mocha in mid-May caused widespread flooding and severe damage to the rice fields, particularly in Magway and Sagaing.

Rice Area Estimates: Despite climatic challenges, the rice cultivation area saw a 1.5 percent increase to 724,254 ± 51,638 hectares from the previous year. However, the ADPC estimates were generally lower than the General Administration Department's (GAD) figures from 2018-2020 (the latest available government data).

Rice Production Estimates: Rice production levels experienced an overall growth of 6 percent from 2022, resulting in an estimated 3,129 ± 222 thousand tons in 2023. The estimates were lower than GAD's 2020 estimates.

Regional Variations: Ayeyarwady and Sagaing regions reported significant area and production growth, while Mon and Mandalay experienced substantial declines. During this time, thousands of incidents resulting from conflict continued in many parts of the country.

Model Improvements: The improved rice classification model incorporated complete seasonal data, leading to more accurate estimates for 2023.

Background

The post-monsoon summer season, which runs from January to May in the coastal regions and from March to June in the inland regions, is characterized by its relative dryness. In mid-May, Cyclone Mocha caused intense rainfall and widespread flooding, especially along water reservoirs and irrigation channels, and led to significant losses among farmers [1].

Rakhine, the most afflicted state, was not included in this analysis due to its low contribution to summer rice production. Sagaing and Magway, however, endured extensive damage to rice fields from record rainfall. Townships such as Salin, Pwintbyu, Kyaukhtu, and Yesagyo in Magway, and Chaung-U, Tabayin, Myaung, Shwebo, and Pinlebu in Sagaing experienced heavy destruction.

Prior to the cyclone, weather conditions were normal, but the end of the season saw anomalously low rainfall and a delayed onset of monsoon rains. Even with the storm in May, total monthly rainfall was less than in previous years for most states and regions. For instance, even though they were directly in the cyclone's path, Magway and Sagaing experienced rainfall comparable to previous years. A detailed view of the daily rainfall in these regions in May against the long-term daily average is shown in Figure 1 to highlight the year's generally drier conditions.

The monthly anomalies portrayed in Figure 2 indicate that April, May, and June have been drier than the historical average across most states and regions, regardless of the rain brought by the cyclone. This pattern of diminishing rainfall towards the end of the season, as seen in the cumulative precipitation anomalies, suggests a shift in the country's rainfall patterns.

Despite the climatic events, the majority of the summer rice had been harvested by the season's end. Meanwhile, this period saw thousands of conflict-related incidents reported in many parts of the country [2].

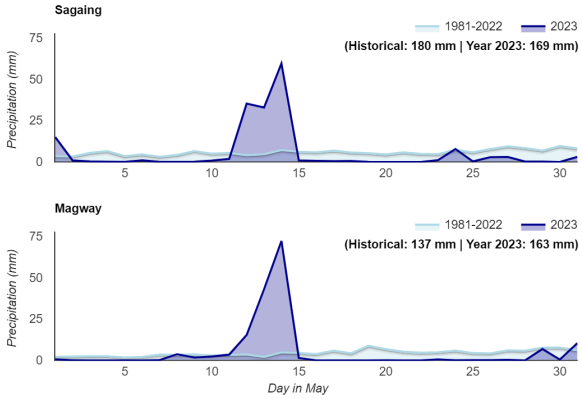

Figure 1. The daily precipitation in May against the daily average in May across 1981-2022 in Sagaing (top) and Magway (bottom).

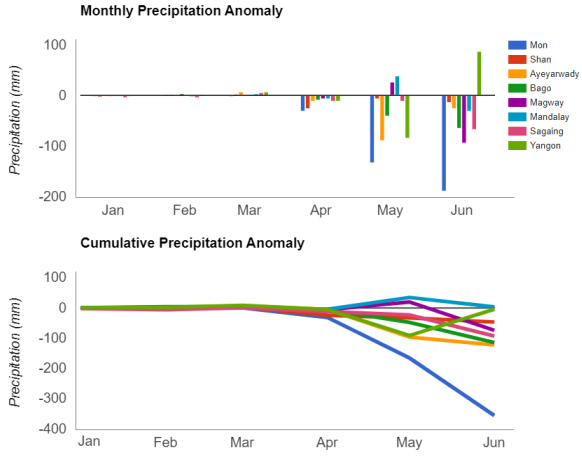

Figure 2. The monthly precipitation anomaly (top) and the cumulative precipitation anomaly (bottom).

Cultivated Rice Area Maps

The detailed land cover maps in Figures 3 and 4 visually depict the spatial distribution of areas dedicated to rice cultivation, crop farming, and other land use categories across the eight rice-growing regions and states. These maps, produced through a random forest model trained on optical and radar satellite imagery, illustrate the estimated extent of rice cultivation during the 2023 summer season. For an in-depth understanding of the data, methodology, and limitations, readers may refer to ADPC's previous reports [3-5].

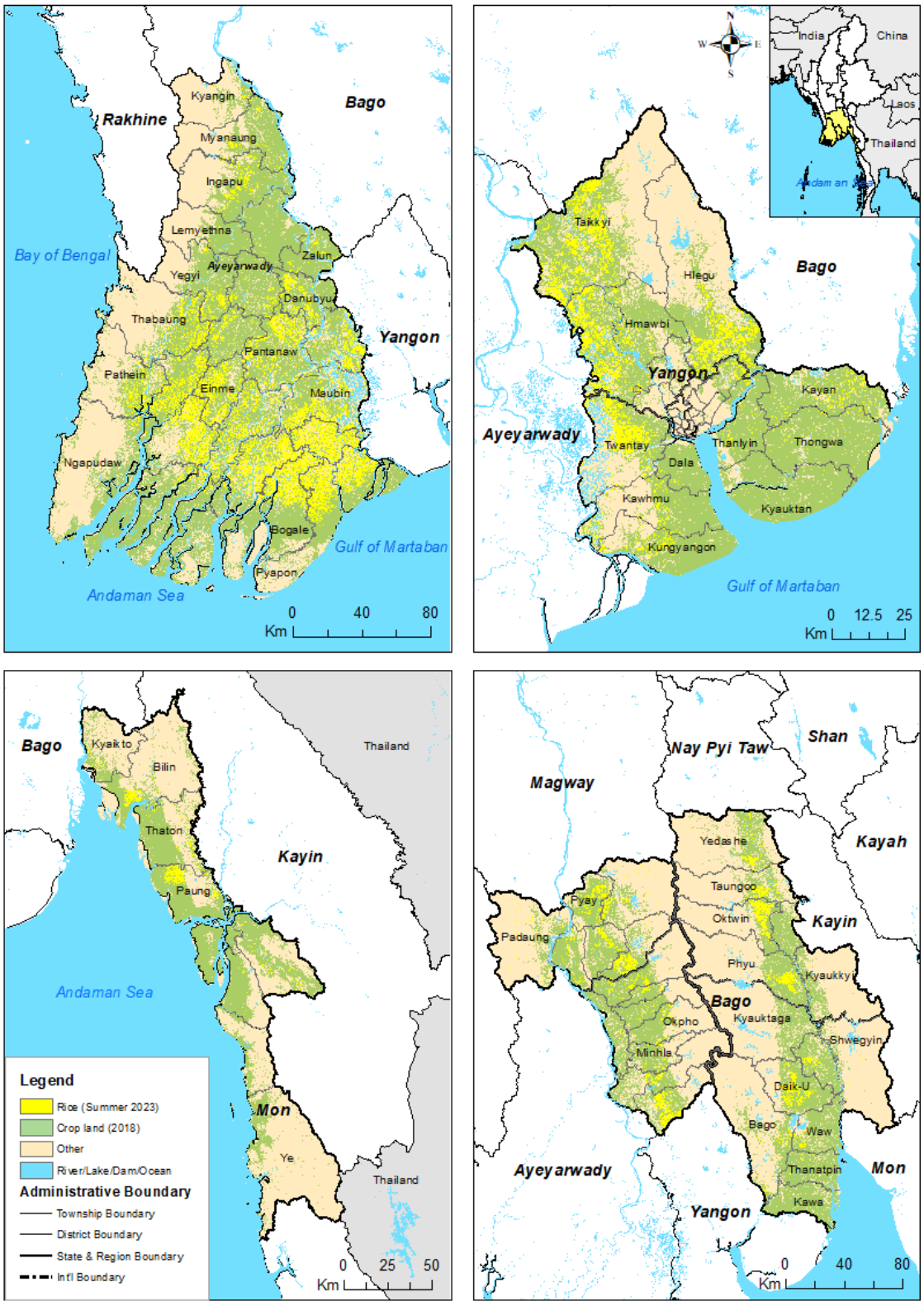

Figure 3. Land cover maps highlighting the cultivated rice area extent (in yellow) in the coastal regions/state

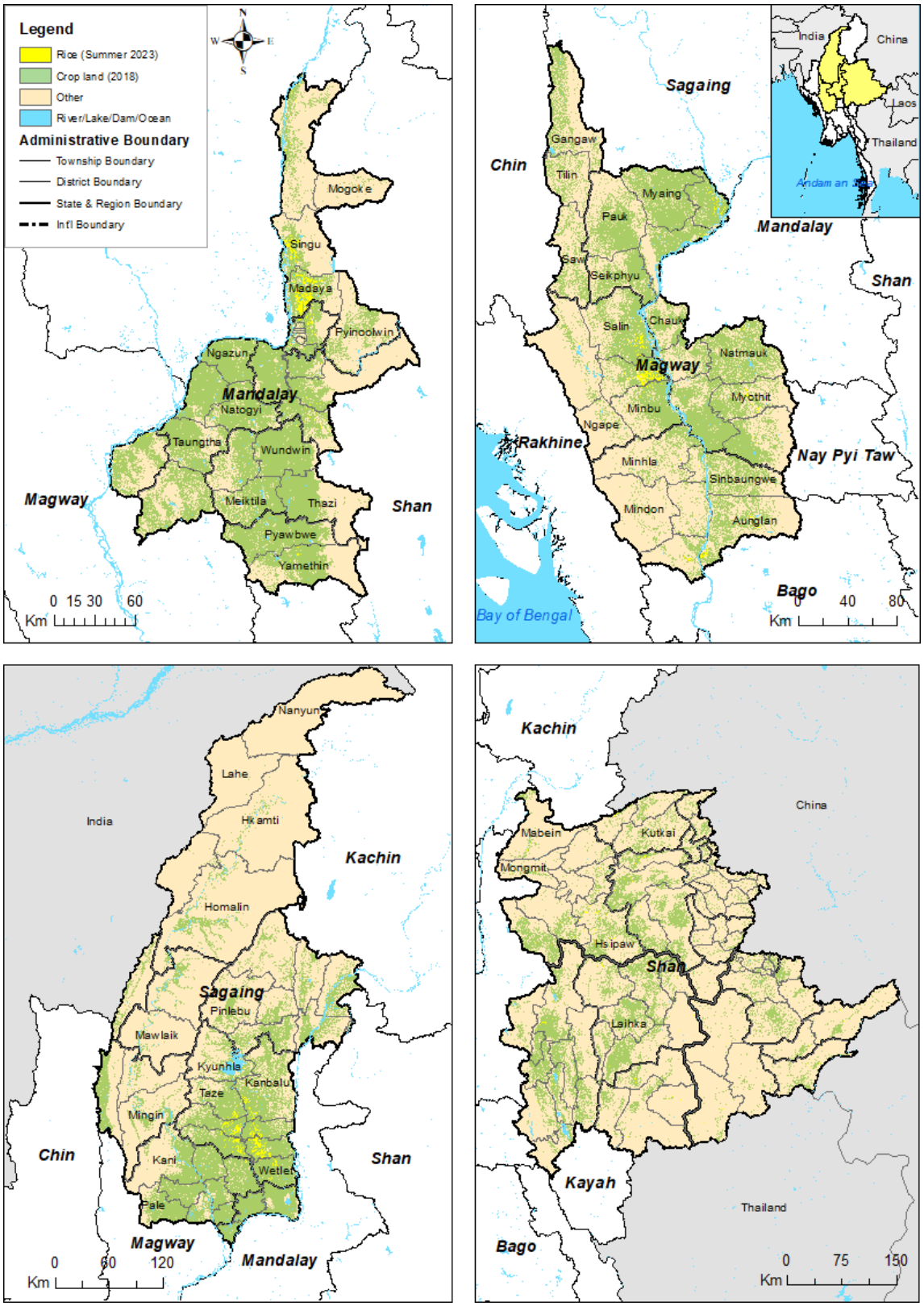

Figure 4. Land cover maps highlighting the cultivated rice area extent (in yellow) in the inland regions/state

Rice Area Estimates

The mapped rice areas were validated and error-adjusted on a state/region level to produce the estimates shown in Table 1. In 2023, the rice cultivation area saw a modest increase of 1.5 percent from the previous year, totaling 724,254 ± 51,638 hectares. Most regions reported a reduction in rice cultivation area, with the notable exceptions of Ayeyarwady and Sagaing regions, which showed increases of 13.9 and 17.2 percent, respectively.

The model used for rice classification demonstrated improvements in performance from last year, primarily due to a complete seasonal analysis across two years. For instance, an increase from last year's estimate was detected in Ayeyarwady's Ingapu township, representing a 2 percent underestimation in last summer's map. Also, Yangon's Thongwa and Kayan townships detected crop fields that were misclassified as rice in 2022, leading to a 20 percent overestimation in the previous year's estimates. Similarly, an overestimation of rice was observed in Bago's Kawa, accounting for 10 percent of 2022's total estimate. Furthermore, the model noted discrepancies in Mandalay's Kyaukse and Myittha townships and in Mon along the Bilin River. These areas represented 13 percent of the totals for the region and state and were interpreted this year as cropland. However, it's difficult to corroborate these differences without ground truth data.

To assess changes in rice area over time, a comparison is made between ADPC estimates for summer 2022-2023 (or post-monsoon 2021-2022) and the last available government data by GAD from 2018-2020. ADPC's estimates for most states and regions were lower than GAD's; however, due to the model's classification improvements, the estimates for Yangon and Bago now closely align with GAD's 2020 figures. It is important to note that ADPC and GAD use different methodologies, which should be considered when directly comparing numbers.

Table 1: A comparison of rice area estimates in key regions of Myanmar from 2018-2020 (GAD) and 2022-2023 (ADPC).

State or Region	GAD 2018 (ha)	GAD 2019 (ha)	GAD 2020 (ha)	ADPC 2022 (ha)	ADPC 2023 (ha)	Uncertainty 2023 (ha)	Uncertainty 2023 (%)	Change 2022-2023 (%)
Ayeyarwady	552,398	471,499	616,843	349,841	398,483	26,873	6.7	13.9
Yangon	76,071	82,328	68,856	81,422	68,386	6,354	9.3	-16.0
Bago	166,271	169,061	138,115	152,683	130,930	8,734	6.7	-14.3
Mandalay	66,664	46,505	34,087	29,182	24,254	1,879	7.7	-16.9
Magway	23,717	22,343	10,942	15,501	14,918	2,276	15.3	-3.8
Shan	21,040	38,998	47,435	19,836	17,939	2,129	11.9	-9.6
Sagaing	122,803	130,768	36,874	45,143	53,005	1,541	2.9	17.4
Mon	11,346	11,413	12,279	19,635	16,340	1,853	11.3	-16.8
Total	1,040,310	972,915	965,431	713,243	724,254	51,638	7.1	1.5

Rice Production Estimates

The rice production estimates, presented in Table 2, were computed based on the rice area estimates and yield reports from the International Food Policy Research Institute (IFPRI) household survey [7]. The total production levels saw a 6 percent increase from last year to approximately 3,129 ± 222 thousand tons in 2023. The growth in production is attributed to increased rice area and yield in the Ayeyarwady and Sagaing regions. In contrast, Mon State and Mandalay show substantial declines in production due to reductions in area and yield. Finally, Yangon and Bago show declines in production due to the lower area estimates adjusted from overestimation last year.

Figure 5 compares the ADPC's area and production estimates for 2022-2023 with figures from GAD in 2020. The comparison shows that the ADPC estimates were almost 40 percent lower, primarily due to significant reductions in the rice area in Ayeyarwady since 2020.

Table 2: A comparison of rice production estimates in key regions of Myanmar in 2020 (GAD) and 2022-2023 (ADPC).

State or Region	GAD 2020 Prod. (*th tons)	IFPRI 2022 Yield (kg/ha)	IFPRI 2023 Yield (kg/ha)	Change Yield (%)	ADPC 2022 Prod. (th tons)	ADPC 2023 Prod. (th tons)	Uncertainty 2023 (th tons)	Change Prod. (%)
Ayeyarwady	2,708	4,271	4,551	7	1,494	1,813	122	21
Yangon	388	4,115	4,272	4	335	292	27	-13
Bago	895	4,015	4,119	3	613	539	36	-12
Mandalay	228	4,479	4,177	-7	131	101	8	-22
Magway	78	4,225	4,272	1	65	64	10	-3
Shan	207	3,092	3,105	0	61	56	7	-9
Sagaing	452	4,023	3,943	-2	182	209	6	15
Mon	62	3,924	3,315	-16	77	54	6	-30
Total	5,018				2,959	3,129	222	6

*thousand tons

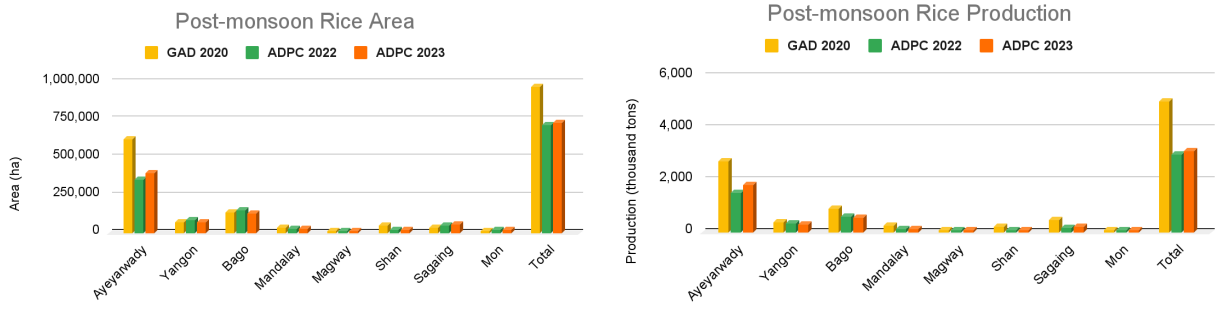

Figure 5. A comparison of rice area and production estimates in key regions of Myanmar in 2020 (GAD) and 2022-2023 (ADPC).

Summary and Future Directions

Overall, Myanmar's 2023 summer rice cultivation season saw a slight increase in total area and production, largely attributable to increases in the Ayeyarwady and Sagaing regions. Despite being marked by unusual climatic events, much of the season's rice had already been cultivated when Cyclone Mocha struck.

However, the combined effects of low rainfall, delayed onset of the monsoon rains, and Mocha's aftermath could threaten the upcoming Monsoon rice production. Future work will involve mapping the 2023 monsoon rice season as well as the years 2017-2020 and comparing area estimates with the Burmese government's historically available data. This analysis will help improve the quality of existing data related to cultivated rice area and production and contribute to a better understanding of the broader factors influencing food security in Myanmar.

References

[1] Food and Agriculture Organization (FAO). 2023. Tropical cyclone Mocha, Myanmar. ArcGIS StoryMaps. https://storymaps.arcgis.com/stories/a97314f4fec34a448721f320829acfbe

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