Global rice market: recent return to normalcy threatened by heightened tensions between Pakistan and India?

11/05/2025

Confidential

Summary

After two years of abnormally high levels, the prices of rice have fallen significantly since September 2024. The concentration of the world's rice production in Asia, with four countries responsible for 80% of global exports (India, Thailand, Vietnam and Pakistan), which usually ensures the stability of this market, also makes it sensitive to disruptions caused to the exports of a single major player. The restrictions imposed by India, the world's leading exporter, on its rice exports in September 2022 and again in July and August 2023, contributed significantly to an exceptional rise of almost 50% in prices between September 2022 and January 2024. On the contrary, between September 2024 and March 2025, the lifting of the Indian embargo on its exports enabled prices to return to their 2022 levels.

The turmoil in the rice market has highlighted the vulnerability of certain African and Asian countries to rice imports. The exemptions granted by India to more than twenty-five countries to ensure their food security, particularly in sub-Saharan Africa, and the increase in exports from a few major producers, notably Pakistan, Vietnam and Thailand, have helped to offset India's temporary withdrawal.

The price of rice has probably bottomed out, due to the recent depreciation of the dollar, but this season's bumper harvests in Asia should prevent a further rise. This return to normal price levels should benefit African and Asian rice importers but weigh on exporters that had benefited from India's withdrawal between 2022 and 2025, notably Pakistan, Vietnam and India.

However, current escalating tensions between India and Pakistan could once again disrupt the global rice trade. Together, the world's largest and fourth largest exporters have accounted for between 40% and 48% of global exports over the last five years. In addition, these two countries play an important role in global exports of cotton, spices, sugar, and tea.

In the medium term, rice is one of the cereals that could benefit from an increase in productivity because of climate change, which would have a positive impact on growing conditions, particularly in South Asia, north-east China and South America, and would widen cultivable areas. Rice production is nevertheless expected to suffer in the medium term in Central Asia, particularly in Pakistan, for the same reasons.

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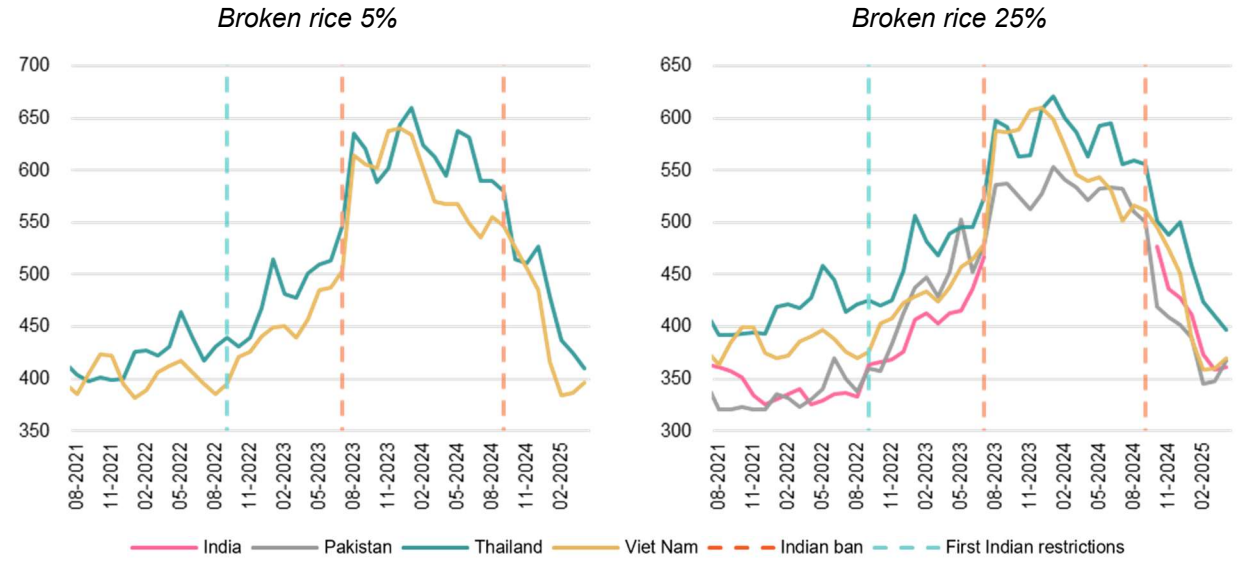
1. A return to normal on the rice market, after two years of high prices

1.1. Rice export markets: a return to normal after two years of high prices

Between September 2024 and March 2025, India gradually lifted the general embargo it had imposed on its rice exports since July 2023 (see table 1). India's return to international markets has helped to ease price tensions: while the reference price (broken Thai rice, 5%) rose by 16% in the month following the announcement of the restrictions on Indian exports (between July and August 2023), it fell by 29.3% between September 2024 and April 2025. In last April, the reference price for rice was 410, close to its average price between 2015 and 2019 ($404), and following a high of $660 in January 2024 (*see* figure 1).

Figure 1 – Rice export prices (USD/tonne)



Source: FAO
Nota: Prices shown are FOB, i.e. excluding transport and insurance costs.

After two years when world rice production was lower than output, forcing a reduction in the levels of reserves accumulated in most producing countries (see figure 4), **production has once again been higher than[1] world demand since the 2023/2024 season and should remain so in 2024/2025**, according to the USDA.

Other factors explain the gradual rise in rice prices between September 2022 and July 2023:

- India had already undertaken to restrict exports of part of its rice production (export duties on harvested rice, brown rice, non-basmati white rice and a ban on exports of broken rice, *see* table 1).
- Pakistan, the world's ninth largest producer and fourth largest exporter of rice, suffered major flooding between June and September 2022, which reduced its production by 21.5% in 2022.[2]
- The market for fertilisers, which are used extensively in rice cultivation, was severely disrupted in 2022 and 2023, due to export restrictions imposed by China on nitrogen and phosphate, disruptions caused by the war between Russia and Ukraine (Belarus and Russia being major fertiliser producers), and bottlenecks in the Red Sea caused by Houthi attacks on container ships carrying part of the world's fertiliser trade.

[1] In figure 4, demand corresponds to domestic use, which includes all production that is neither exported nor stored, and used for human consumption, animal feed or the production of biofuels.
[2] FAO data, GSA calculations.

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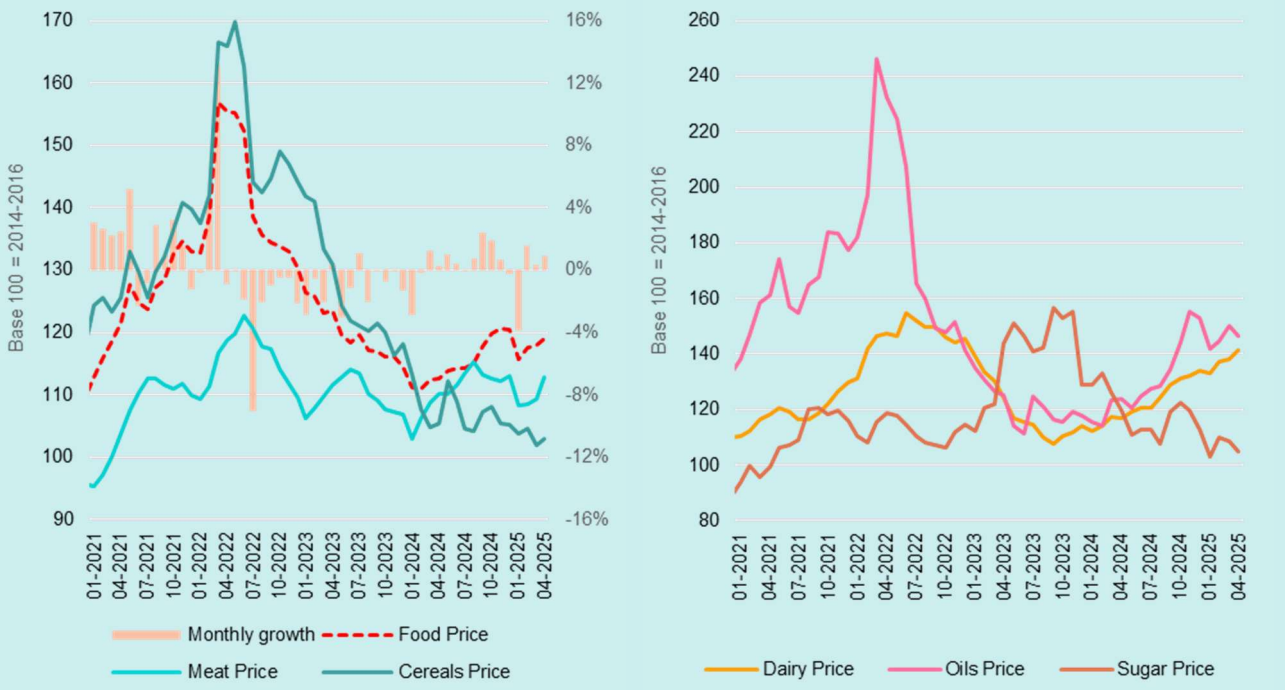
The resolution of these difficulties and the absence of any significant weather warnings affecting South and South-East Asia in 2024-2025 have meant that prices have recently returned to levels comparable to those seen in the first half of 2022.

Box – Outside rice, world food prices are on the rise

Between April 2024 and April 2025, the real prices[3] of food products rose by 5.6%, according to the Food and Agriculture Organization of the United Nations (FAO), driven upwards by the prices of dairy products (20.8% increase over the period) and oils (18.5%). The **slight fall in cereal prices** (-2.5%, which account for 43% of the calories consumed by the world's population[4]) and the significant drop in sugar prices (-12.5%) nevertheless tempered this general rise in prices. **However, real food prices remain 19% higher than their average from 2014 to 2016, but** 24.1% lower than their peak in March 2022, shortly after the start of the war between Russia and Ukraine.

Figure 2 – World food price index



Source: FAO, GSA calculations
Note: The monthly variation, in light red, refers to the month-on-month change in real food prices, calculated according to the FAO reference index.

Although down year-on-year, real cereal prices rebounded in April 2025 (+1.2%)**, driven by higher prices for the main cereals.** This was particularly the case for wheat, which was affected by the fall in Russian exports. The price of maize has also risen as a result of exemptions from customs duties granted by the United States to Mexico, the main importer of maize, and the seasonal reduction in maize stocks in the United States. World trade in cereals is expected to fall by 3.9% in 2024/2025 compared with the previous season, to 485 million tonnes (on total production of 2,848 tonnes).[5] This expected decline in world trade is likely to be the

[3] Real prices are nominal prices adjusted for consumer price inflation for a wider basket of goods than just food.
[4] Data taken from the FAO's 2022 Food Balance.
[5] The data given in this paragraph and the next which do not correspond to the values available in figure 2 are taken from the latest FAO report available: *Food Outlook, Markets at a Glance*, published in November 2024.

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result of lower cereal imports from China, as well as lower wheat exports from the European Union, Russia and probably Ukraine.

World sugar prices have been at their lowest since April 2021, due to favourable weather conditions in Thailand and India for the 2024/205 season, and have recently fallen (-14.5% in real terms, between October 2024 and April 2025) due to concerns about the global economic outlook and its impact on demand for beverages and processed foods, which make up the bulk of global sugar consumption. Production is nevertheless expected to fall in the 2024/2025 season, compared with the record set in the previous season, due to droughts in the southern regions of Brazil, the world's leading sugar producer's main growing areas, and a shift in sugarcane volumes towards ethanol production in India.

Meat prices, particularly for pork, rose across the board between January and April 2025, driven by increased demand for imports, particularly from Germany, which was recently re-established as a foot-and-mouth disease-free zone, which particularly affects pigs.

1.2. World rice production is dominated by Asia, which consumes most of the rice but exports only a tenth of it, mainly to Africa.

Asia accounts for the bulk of global rice production (89.6%), followed by Africa (5.3%), Latin America (3.4%) and North America (1.2%), which is expected to reach **533 million tonnes for the 2024/2025 season**[6] (*see* figure 4). China and India each account for more than a quarter of world production (see figure 3). The similarity of these production levels conceals major differences in yields (7 t/ha in China, compared with 4.2 t/ha in India), which can be explained by the intensive use of fertilisers in China. The other major producers are Bangladesh (7.6% of world production), Indonesia (7.0%), Vietnam (5.7%), Thailand (4.3%), Myanmar (3.3%), the Philippines (2.6%), Pakistan (1.9%) and Cambodia (1.7%). Among them, Bangladesh, Indonesia and the Philippines are also major rice importers. With such a high concentration in South and South-East Asia, global rice production is particularly sensitive to El Niño climatic phenomena, which tend to dry out and warm up the climate in these regions.

Around a tenth of the world's rice production is exported each year, in particular to Africa and South and South-East Asia (*see* figure 4). Most of this production is consumed, particularly in China, where exports are low compared to its position as the world's leading rice producer, and in India, which will be exporting almost 15% of its rice production until 2022. **World rice exports fell by 5.2% during the 2022/2023 season, while global supply stagnated (+0.4%)**, confirming that some countries have given priority to satisfying the needs of their populations, while aggregate demand rose by 1.2%. Exports should return to their 2021/2022 level in the 2024/2025 season, at just over 58 million tonnes.

[6] Each season runs from July to June of the following year, i.e. the last two quarters of one year and the first two quarters of the following year.

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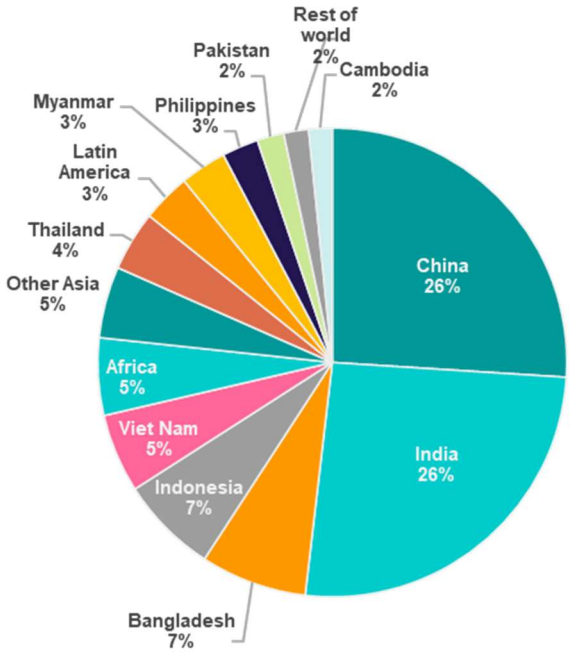
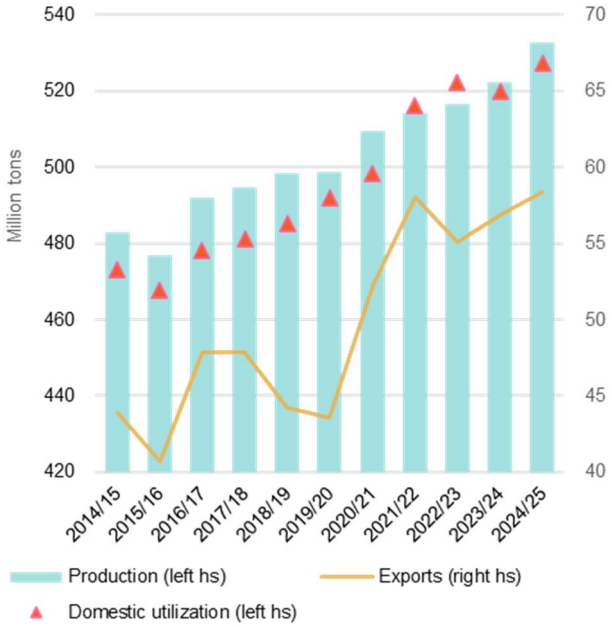
Figure 3 – Breakdown of world rice production (2023)



Source: FAO, GSA calculations

Figure 4 – World rice supply and demand



Source: USDA

Box – Rice production on the African continent

In 2023, Africa, the second most important continent in world rice production behind Asia, produced 42.7 million tonnes of rice.[7] Eleven countries account for 89% of the continent's production, with varying levels of agricultural development. Of the African countries producing more than a million tonnes of rice a year, only **Egypt** has higher yields than India (5.6 million tonnes produced in 2023, with a yield of 8.7 tonnes/ha, compared with 3.3 tonnes/ha in India[8]). Four countries have more moderate yields, comparable to those of Pakistan (3.7 tonnes/ha, in 2022/2023): **Tanzania** (3.6 million tonnes produced and a yield of 3.0 tonnes/ha), **Mali** (3.0 million tonnes and 3.3 tonnes/ha), **Senegal** (1.5 million tonnes and 3.8 tonnes/ha) and **Ghana** (1.5 million tonnes and 4.0 tonnes/ha). The six remaining countries have relatively low agricultural yields: **Nigeria, the continent's main producer** (8.9 million tonnes and 2.0 tonnes/ha), **Madagascar** (5.1 million tonnes and 2.5 tonnes/ha), **Guinea** (3.5 million tonnes and 1.5 tonnes/ha), **Côte d'Ivoire** (2.0 million tonnes and 2.9 tonnes/ha), the **Democratic Republic of Congo** (1.8 million tonnes and 0.95 tonnes/ha) and **Sierra Leone** (1.4 million tonnes and 1.5 tonnes/ha). **The growth in rice production on the African continent is almost exclusively due to the increase in the size of cultivated areas**: while production increased fivefold between 1980 and 2023, rice yields only increased by 25%, while cultivated areas increased from 4.7 to 18.4 million hectares (a fourfold increase).

[7] Data taken from the FAO and processed by GSA (the FAO's method of calculation is different from the amounts found in USDA data, which include stock variations), *idem* in the rest of the paragraph.
[8] USDA data for the 2022/2023 season.

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Figure 5 – Development of rice growing in Africa

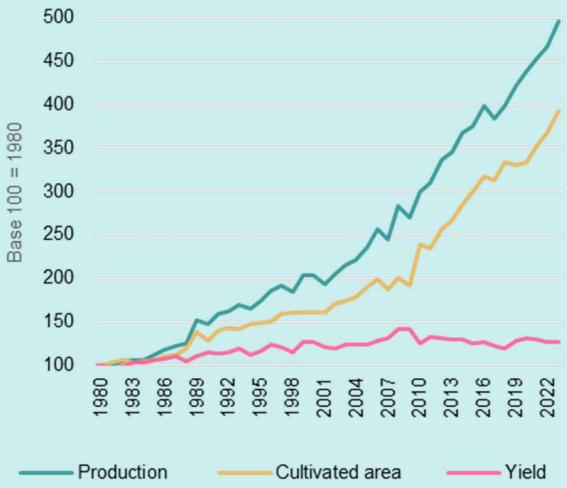
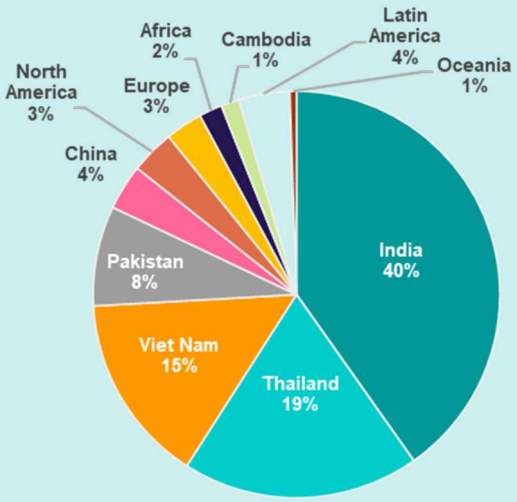


Figure 6 – Breakdown of world exports of milled rice (2023)



Source: FAO, GSA calculations

2. The Indian embargo on its rice exports has increased the risk of food insecurity among vulnerable importers, despite exemptions and compensation from other producers

2.1. Stability of the rice export market historically ensured by India

Price fluctuations on the world rice market have historically been less pronounced than for other agricultural commodities. Until 2022, India, by far the world's largest exporter, played a stabilising role. *Through* the Food *Corporation of India* (FCI), the Indian government regulates the food market, particularly rice, by managing its strategic reserves. This management has three objectives:

- A minimum support price (MSP) for food purchases, based on agricultural production costs, in particular fertiliser and labour costs, is guaranteed to farmers to reduce price uncertainty and thus stimulate agricultural production.
- Stocks can be released at levels that reduce tensions on food markets and stabilise prices.
- The stocks support social food protection programmes, such as the Targeted Public Distribution System (TPDS).

What's more, 78% of the world's rice production is used for human consumption[9], and only a small proportion is used for biofuels (1.8%) or animal feed (4%), which contributes to the stability of demand growth.

The corollary of this relative stability ensured by the preponderance of a small number of major exporters is the market's sensitivity to the agricultural policies implemented in these key countries. The 2007/2008 agricultural season, for example, was marked by major export restrictions imposed by the world's leading rice producers, affecting 80% of global exports and causing rice prices on international markets to triple in the space of a few months.

[9] FAO, OECD, *Agricultural Outlook 2024-2033*, 2023 data.

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2.2. India's restrictions on rice exports have weakened countries dependent on rice imports

For almost two and a half years, from September 2022 to March 2025, India restricted its rice exports, creating unusual instability on this market. Initially, in September 2022, the Indian government imposed a 20% export duty on harvested rice, brown rice and non-basmati white rice, and banned exports of broken rice. The aim was to limit the excessive outflow of agricultural commodities (wheat and onion exports were also banned at the time), exports of which were rising substantially due to the increase in feed grain prices - broken rice was often exported for animal feed[10]. As a result, broken rice exports (which accounted for 21.7% of Indian exports) fell by 85% in the fourth quarter of 2022, compared with the first eight months of the year.

In July and August 2023, less than a year later, the **Indian government imposed a 20% export duty on parboiled rice, a minimum export price on basmati rice and an embargo on exports of non-basmati white rice**, without reversing the restrictions on exports of harvested rice, brown rice and broken rice. These measures were designed to address two issues. On the one hand, the World Meteorological Agency announced a major El Niño event, which was expected to cause droughts in the rice-growing regions of South-East Asia during the 2023/2024 season, particularly among the world's two leading exporters: India (39.9% of world exports in 2022) Thailand (13.8%) and Vietnam (7.9%). During the 2023/2024 season, these forecasts ultimately proved to be exaggerated, which explains why world production rose slightly (*see* figure 4). On the other hand, the aim was to contain inflation, particularly food inflation, which in India was still running at an annual rate of 11.5% in July and 9.4% in August 2023.

Table 1 – Summary of restrictions on rice exports from India

Type of rice	Modality of restriction	Implementation date	Withdrawal date
Harvested rice	20% export duty	9 Sept. 2022	23 Oct. 2024
Wholemeal rice	20% export duty	9 Sept. 2022	23 Oct. 2024
Parboiled rice	20% export duty	25 August 2023	28 Sept. 2024
	10% export duty	28 Sept. 2024	23 Oct. 2024
Basmati rice	Minimum export price	27 August 2023	14 Oct. 2024
Non-basmati ex-parboiled	20% export duty	9 Sept. 2022	27 July 2023
	Export ban	27 July 2023	28 Sept. 2024
	Minimum export price	28 Sept. 2024	14 Oct. 2024
Broken rice	Export ban	9 Sept. 2022	7 March 2025

Source : IFPRI

India's parboiled rice exports, which accounted for a third of its exports in 2022, fell by 43.4% in the three months following the introduction of export restrictions (September 2023 to November 2023), before returning to normal levels by December 2023. In contrast, exports of non-basmati white rice, which accounted for 27% of Indian exports, fell by 86.7% in the year following the restrictions. This decrease in exports of non-basmati white rice and broken rice was partly offset by an increase in export volumes of basmati rice which, after a 10.5% decrease in the first three months following the restrictions, increased by 26.2% compared with their

[10] Food export restrictions have eased as the Russia-Ukraine war continues, but concerns remain for key commodities, *IFPRI*, 23/01/2023.

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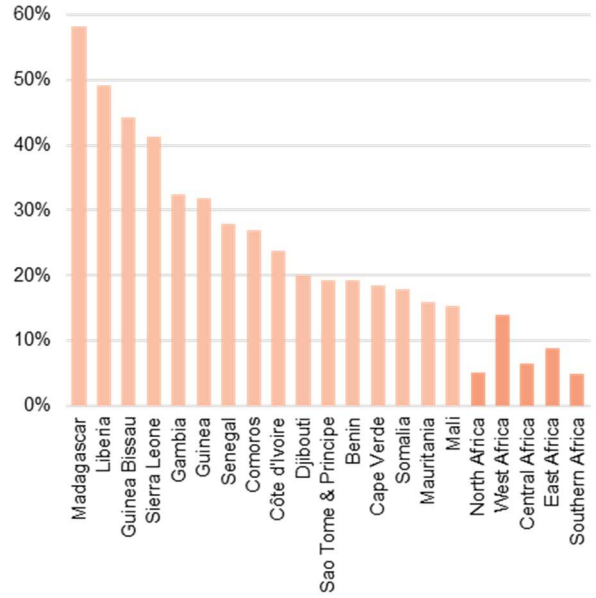
2022 level, reaching an average of 464 thousand tonnes per month between September 2023 and August 2024.

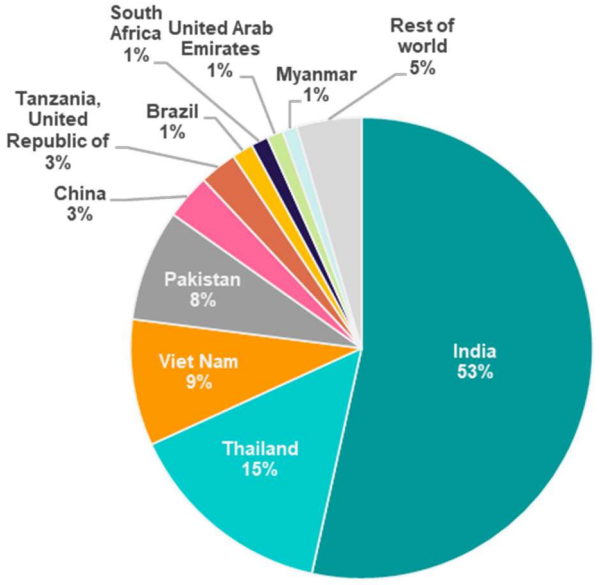
Africa is particularly vulnerable to variations in the price of rice, since it imports, on average, 47% of its rice consumption. [11]However, before India implemented restrictions on its exports in July and August 2023, African economies were the main outlet for Indian rice exports, with 54.9% of its exports going there between July 2022 and June 2023 (*see* figure 11). The African continent imported 53.5% of its rice from India in 2022 (see figure 8), which accounted for more than 60% of rice imports from 17 African countries, and more than 80% for nine of them[12] : Guinea, Liberia, Togo, Central African Republic, Rwanda, Ethiopia, Eritrea, Somalia and Madagascar. India's export restrictions were therefore likely to cause major disruptions to African food supplies, particularly in West Africa, where rice accounts for 14% of people's energy intake (*see* figure 7). In ten African countries, rice even accounts for more than a fifth of energy intake - these include Madagascar (58%), Liberia (49%), Guinea-Bissau (44%) and Sierra Leone (41%)[13].

Figure 7 – Share of rice in total calorie intake, 2022



Source: FAO, GSA calculations
Reading note: In Djibouti, rice accounts for one-fifth of each inhabitant's dietary energy intake.

Figure 8 – Origin of rice imported by African economies, by volume (2022)



Source : Trade Map

2.3. What happened? The example of Africa

The import restrictions introduced by India led to a 43.2% drop in Indian exports to Africa in the twelve months that followed, compared with the volumes traded in the previous year (*see* figure 11)**. However, this fall in Indian exports to Africa was partly offset by imports from other rice-producing countries, particularly Thailand, Pakistan and Brazil, in the case of Senegal and Côte d'Ivoire** (see figure W and WW). This compensation limited the fall in imported quantities to 11% in the case of Senegal and quickly returned to their usual level in the case of Côte d'Ivoire.

[11] R. J. S. Antonio et al, *India's export restrictions and response of African and Asian retail rice prices*, Food Policy, vol. 132, 2025.
[12] India's export restrictions on rice continue to disrupt global markets, supplies, and prices, *IFPRI*, 07/02/2024.
[13] They are also: Gambia (32%), Guinea (32%), Senegal (28%), Comoros (27%), Côte d'Ivoire (24%) and Djibouti (20%). These results are taken from FAO data for 2022 and calculated by GSA.

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Figure 9 – Senegal's rice imports, by exporting country (thousands of tonnes)

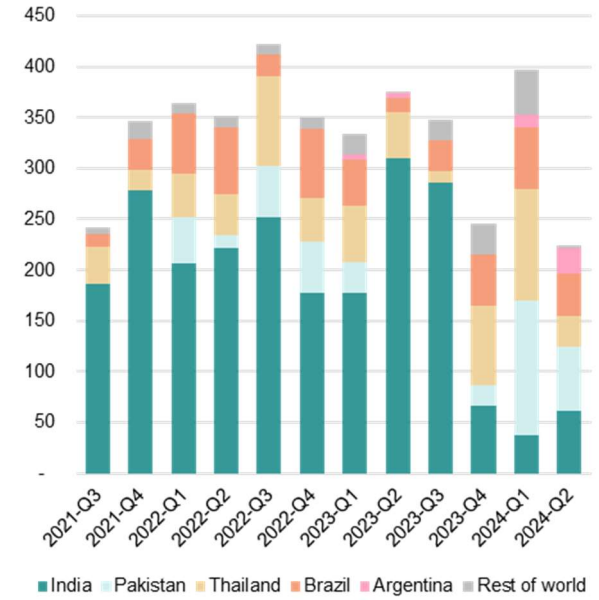
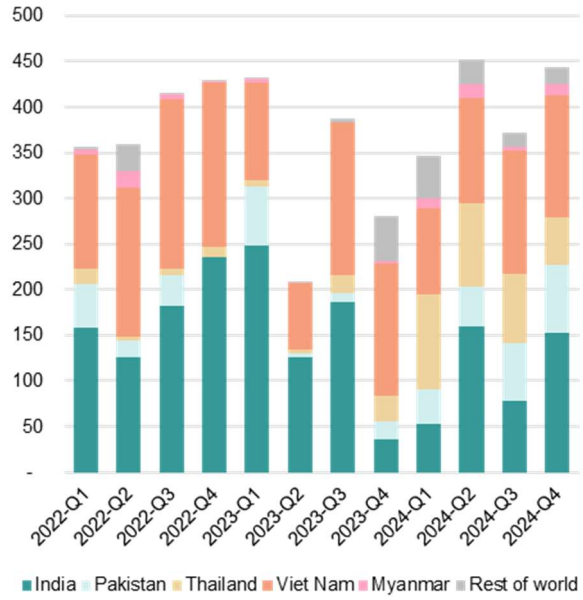


Figure 10 – Côte d'Ivoire rice imports, by exporting country (thousands of tonnes)



Source: Trade Map

Rice prices would have risen by around $100 on local African markets at the height of the period of export restrictions implemented by India, between July 2023 and September 2024. While rice consumption remained virtually unchanged over the period, at 38 million metric tonnes for sub-Saharan Africa, **the cumulative cost of disruptions to rice export markets would have been close to USD 3.8 billion for the continent as a whole**[14]. This is a high estimate, because prices had already started to rise before the Indian announcements, notably due to fears of a major El Niño event in 2023/2024.

India's decision to restrict its rice exports was less damaging than could have been anticipated in July 2023, for at least four reasons:

- **Despite the decline in rice exports to African economies, prices generally rose less on local African markets than on Asian markets between July 2023 and September 2024.** This can be explained in part by **the** fact that **climatic conditions were more favourable in Africa**, and particularly in East Africa where conditions were wetter and more favourable to agriculture, due to the same El Niño phenomenon that had caused droughts in South-East Asia (and contributed to an increase in prices on local Asian markets)[15]**. As a result, production increased for the third year running, particularly for emerging producers in the region such as Tanzania, Mali, Sierra Leone and Senegal.**
- **During this period of export restrictions, India granted export exemptions to more than twenty-five countries, particularly in sub-Saharan Africa, to ensure their food security. In Africa, these were Cameroon, Côte d'Ivoire, Djibouti, Egypt, Gambia, Guinea Bissau, Equatorial Guinea, Kenya, Madagascar, Mali, Mauritius, Senegal and Tanzania**. This Indian-led "rice diplomacy" has taken the form of government-to-government agreements, through India's newly created National Cooperative Exports Ltd (NCEL).
- **Some major producers increased their rice export volumes during the 2023/2024 season, offsetting some of India's withdrawal from international markets. This is particularly the case**

[14] India lifts export restrictions on rice, *IFPRI*, 08/11/2024.
[15] R. J. S. Antonio et al, *India's export restrictions and response of African and Asian retail rice prices*, Food Policy, vol. 132, 2025.

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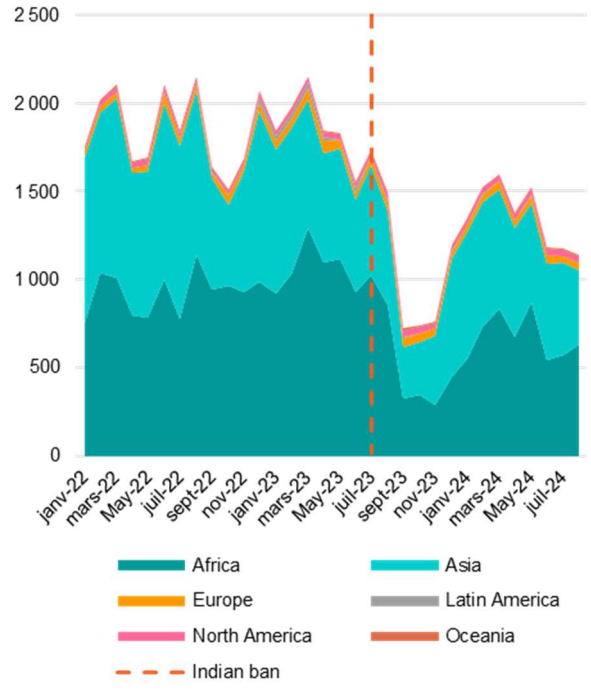
for Pakistan, whose rice exports rose by 42% in volume terms between 2022 and 2024[16], followed by Vietnam (58% increase) and Thailand (29%) as their production recovered. At the same time, China, the world's main rice consumer, has reduced its rice imports, continuing their downward trend - a consequence of the increase in its production for domestic consumption - which has eased the pressure on export markets.

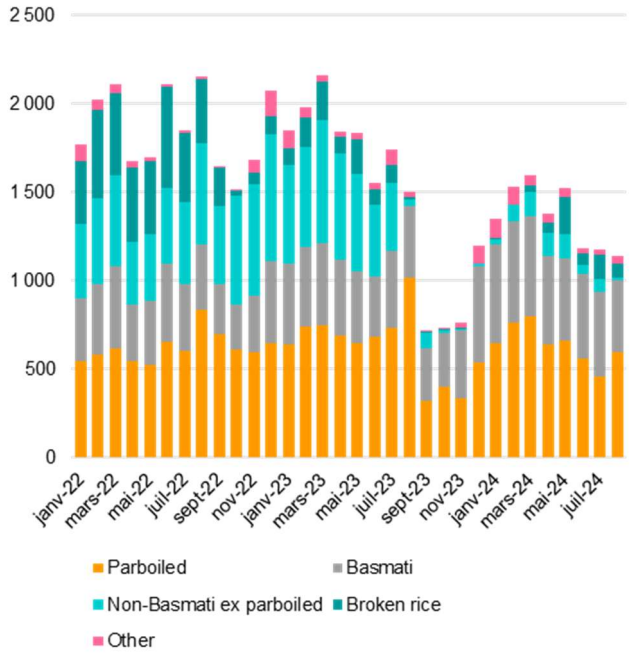
- Shortly after the first announcements of restrictions on Indian agricultural exports, **in August 2023 ASEAN members undertook to refrain from imposing restrictions on their rice exports, to prevent rice prices from rising sharply on international markets**, as they did in 2007-2008. This commitment was also backed by the guarantee of the ASEAN Rice Reserve + 3 (APTERR), which was intended to stabilise the markets if necessary.[17]

Figure 11 – Monthly exports of Indian rice by region (thousands of tonnes)



Source: IFPRI

Figure 12 – Indian rice exports by type (thousands of tonnes)



Source: IFPRI

Box – Overview of food vulnerabilities: coastal Africa, the Gulf and some economies in South and South-East Asia are dependent on rice imports for their food security

Our vulnerability analysis (*see* Map 1) **highlights the importance of South and South-East Asia in global rice exports, and the dependence of coastal sub-Saharan Africa (particularly West Africa), the Gulf and certain Asian countries on rice imports.** In many African countries, rice imports account for a significant proportion of the population's diet. This is particularly the case in Liberia (34% of the population's total calorie intake depends on rice imports), Gambia (30%), Djibouti (20%), Sao Tome and Principe (19%), Somalia (18%) and Senegal (16%). This vulnerability to rice imports also significantly affects Asian countries bordering the world's main producers, notably Bhutan (28%), Oman (17%), Iraq (15%), Sri Lanka (11%), Malaysia (11%), Papua New Guinea (15%) and the Philippines (8%).

[16] Trade Map data, GSA calculations.
[17] J. Glauber, A. Mamun, *Global Rice Market, Current Outlook and Future Prospects*, IFPRI, December 2024.

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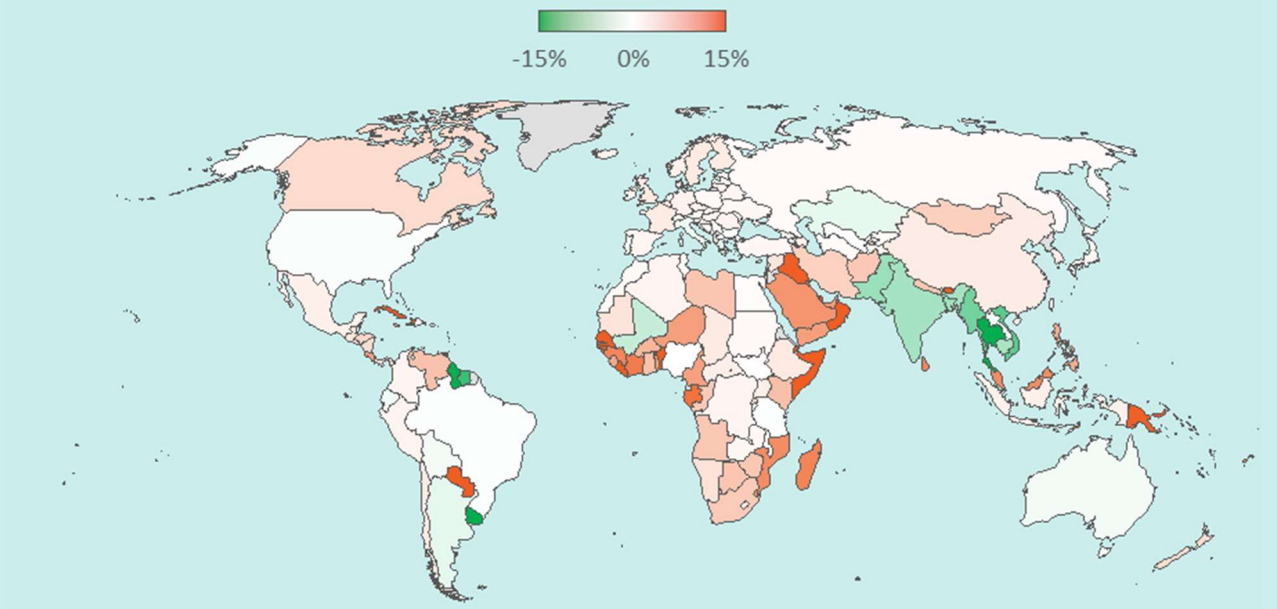
Map 1 – Food dependency on rice imports



Source: FAO Food Balance Sheet, GSA calculations

Note for the reader: The values shown correspond to the share of rice imports in the population's total calorie intake.

- *When the value is positive (red), the country is a net importer of rice.*
- *When the value is negative (green), the country is a net exporter of rice and does not depend on imports for its domestic consumption.*

Calculation method: Share of rice imports in total domestic rice consumption, multiplied by the share of rice in people's total calorie intake.

The export restrictions on the rice market carry the risk of a "domino effect", due to the concentration of production in South and South-East Asia. These restrictions are often the consequence of tensions over domestic production and rising food prices. By closing their borders to rice exports, the countries concerned reserve their own production to prevent a possible shortage, and reduce the pressure exerted by international markets on rice prices. However, restrictions on rice trade imposed by a major producer cause rice prices to rise on rice markets. This was notably the case in India between 2022 and 2025, where export prices rose by 50% between January 2022 and January 2024, but also in 2007 and 2008, when restrictions imposed on 80% of world exports, particularly by India, Pakistan and Thailand, caused rice prices to triple in the space of a few months. **Restrictions imposed by a major producer therefore carry the risk of a chain reaction, triggering an increase in prices on international markets, which in turn pushes other producers to protect their domestic markets by restricting rice exports.**

2.4. Short-term outlook: the fall in world rice prices could be jeopardised by tensions between India and Pakistan

World rice production is forecast to increase from 1.6%[18] to 2.0%[19] between the 2023/2024 season and the current 2024/2025 season, driven mainly by a 3.6% increase in production in India. Aggregate demand is expected to grow at roughly the same rate, from 1.4%[20] to 2.1%[21] - although it should be noted that the USDA is forecasting a greater increase in demand than in supply, while the FAO-AMIS is anticipating the opposite scenario. This stability in the growth of supply and demand, against a backdrop of reduced climatic and commercial risks to agricultural production, suggests that rice prices should converge towards their levels

[18] Data from FAO-AMIS, GSA calculations.
[19] Data from USDA, GSA calculations.
[20] Data from USDA, GSA calculations.
[21] Data from FAO-AMIS, GSA calculations.

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of the first half of 2022, which they are already close to reaching again. However, the price of rice has probably bottomed out, notably due to the appreciation of the rupee, while the minimum support price is set annually by the government. On the other hand, the bumper 2024/2025 rice harvests in Asia should limit a resumption of price rises this year. Indian exports could increase by at least 25% between 2024 and 2025, reaching between 22.5 and 24 million metric tonnes[22], which would again represent 40% of world exports, as in 2022.

This fall in the price of rice on international markets, which should benefit importing countries, particularly in Africa and South and South-East Asia, **could nevertheless weigh on some of the world's major exporters who had benefited from India's relative withdrawal**, notably **Pakistan**, **Vietnam** and **Thailand**. Thai rice exports have already fallen by 30% in the first quarter of 2025, to 2.1 million tonnes, and the trade bodies of Vietnam and Thailand are forecasting a drop in their respective exports of 17% and 24%, to 7.5 million tonnes each, in 2025. [23] **India's return to the markets should also enable African countries dependent on food imports to secure their grain stocks**, as well as supporting East Asian animal feed.

Rising tensions between India and Pakistan, following the attack on a group of tourists in Kashmir which killed 26 people on 22 March 2025, **could, if they escalate, disrupt rice exports from the two agricultural powers.** However, such a trend is far from being confirmed, *especially in* view of the large stocks of rice accumulated by India this season, which peaked at 63 million tonnes on [1]April 2025, five times the level targeted by the government (13.6 million tonnes)[24]. India, the world's largest rice exporter (29% of global exports in 2024[25]) and Pakistan, the world's fourth largest exporter (10.6%), together accounted for two-fifths of global rice exports in 2024. **Disruptions to Indian and Pakistani exports would cause difficulties for the main recipients of their rice production, whose food security is often dependent on rice imports.** This is the case, for example, in **Saudi Arabia** and **Côte d'Ivoire**, whose populations depend on rice imports for 10% and 12% of their calorie intake respectively. This is also the case for **Iraq** (15% of calorie intake depends on rice imports), **Benin** (16%), the **United Arab Emirates** (9%), **Togo** (8%) and **Guinea** (11%), which are major importers of Indian rice, and **Malaysia** (11%), **Senegal** (16%) and the **Philippines** (8%), which import significant quantities of Pakistani rice.

India is also a major player in the production of many foodstuffs, whose trade could also be affected by this emerging conflict: it is the world's leading producer of milk, **protein crops**, bananas, **cotton** and **spices**, and the world's second largest producer of **sugar**, **tea** and wheat, although it plays a marginal role in exports of wheat, milk and bananas, which are mainly produced for domestic consumption. **Although Pakistan's agricultural sector is smaller than India's, it nevertheless plays an important role in world production** of milk (third largest producer), cotton (fifth largest), sugar cane (fifth largest), spices (seventh largest) and wheat (eighth largest), although its exports are significant only in the case of **cotton** and **spices**, the rest being used mainly for domestic consumption.

Box - Long-term outlook for world rice production: what effects are climate change expected to have?

Rice crop yields are sensitive to variations in climate, and most of the world's rice production is concentrated in South and South-East Asia, which are regions dependent on seasonal monsoons. Two phenomena particularly affect the climate in these regions:

- **El *Niño-Southern Oscillations*** (ENSO) are variations in water surface temperatures in the central and eastern Pacific Ocean. This phenomenon recurs in cycles, every three to seven years, and its extreme phases consist of a warming (El Niño) or cooling (El Niña) of 1 to 3°C of the water surface. The El Niño phenomenon is generally associated with a drier, warmer climate in South and South-East Asia.

[22] Global rice prices have hit a floor, but India's supply glut will smother any gains, *Reuters*, 07/05/2025.
[23] Global rice prices have hit a floor, but India's supply glut will smother any gains, *Reuters*, 07/05/2025.
[24] Global rice prices have hit a floor, but India's supply glut will smother any gains, *Reuters*, 07/05/2025
[25] Trade Map data, GSA calculations.

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- The ***Indian Ocean Dipole*** (IOD) is an irregular oscillation in the surface temperatures of the Indian Ocean, with its western part becoming warmer or colder than its eastern part. The positive phases of the IOD are characterised by higher water surface temperatures and more precipitation in the western region of the Indian Ocean, and cooling and drier conditions in its eastern regions. The negative phase is characterised by opposite conditions. The IOD is independent of ENSO.

The conjunction of the El Niño phenomenon and a positive Indian Ocean dipole, both of which tend to cause a warmer and drier climate in South and South-East Asia, **is generally associated with a drop in agricultural yields** - particularly in South Asia. El Niña events are associated with excess rainfall in South and South-East Asia but are less correlated with crop yields.

Many rice-producing countries harvest several crops per season, spread over several periods of the year. This means that one-off climatic events affecting one growing period can be offset by more favourable weather conditions for subsequent crops. This is the case in India, for example, where *Kharif* crops (65% of production), which depend on the monsoons, are planted between May and August and then harvested between September and January, and *Rabi* crops (35% of production), which are irrigated and planted in December and January and then harvested between March and May. Thailand and the United States, the world's second and sixth largest rice exporters respectively, also divide their production between two crops, although less equally (around 80% of production goes to the main crop). Vietnam even divides its rice production between five crops, planted from November to September.

According to the most recent agro-climatic models, rice cultivation should see a significant overall increase in productivity by 2030, whatever the climate scenario envisaged.[26] Rice-growing productivity is set to increase by 5% by 2030, compared with its level in the early 2000s. **Among maize, soya, wheat and rice, only rice would show a significant improvement in productivity in the tropics**. **But while rice yields should increase in South Asia, north-east China and South America, they should fall massively in Central Asia, particularly in Pakistan and Iran**. Under a controlled climate change scenario (scenario SSP 1-2.6 of the IPCC[27]), productivity is expected to rise uniformly in all the major producing countries over the coming decades, particularly in China, India and Thailand, but with the notable exception of Pakistan. In the event of severe global warming (SSP 5-8.5[28]), on the other hand, the reference models predict more heterogeneous results among the main producers – Pakistan could lose four-tenths of its productivity, while the effect on productivity would be more or less neutral for China, Bangladesh and Thailand, but still positive for India, Indonesia, Myanmar and Vietnam. In addition, **climate change is expected to increase the area under rice cultivation, whatever the scenario considered**, particularly around the equator and as far north as 45th degrees latitude (*i.e.* northern China). These forecasts contain considerable uncertainty, largely due to the difficulty of predicting the effect of an increase in the concentration of carbon dioxide in the atmosphere, which should encourage photosynthesis.

However, more pessimistic projections are obtained from models projected over smaller areas.[29] This is the case, for example, of the Mekong delta, which is essential to Vietnam's rice production and is the world's third largest exporter. Using climate projections that are nonetheless more optimistic, an analysis of temperature rises, a reduction in the number of rainy days during the dry season and an increase in the number of rainy days during the wet season could lead to a 36.5% drop in crop yields in this region, which produces

[26] J. Jägermeyr et al, *Climate impacts on global agriculture emerge earlier in new generation of climate and crop models*, Nature Food, 2021.
[27] The IPCC's global warming scenarios are organised into five groups of possibilities (called *shared socio-economic pathways*, or SSPs), each of which reflects a set of socio-economic assumptions, such as population growth, education levels, urbanisation, or GDP. **SSP-1 predicts a gradual shift towards sustainable practices**, and '2.6' corresponds to the value of 'radiative forcing' that would be reached by the end of the 21st century, i.e. the average change in the Earth's energy balance (a higher value corresponding to more substantial disruption).
[28] SSP 5-8.5 corresponds to the most pessimistic scenario in terms of global climate change. It assumes an energy-intensive economy based on fossil fuels.
[29] Z. Jiang, *Future changes in rice yields over the Mekong River Delta due to climate change - Alarming or alerting?*, Theoretical and Applied Climatology, 2018.

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more than half (56%) of Vietnam's rice, between 2020 and 2050, given the current state of knowledge and agronomic techniques.

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