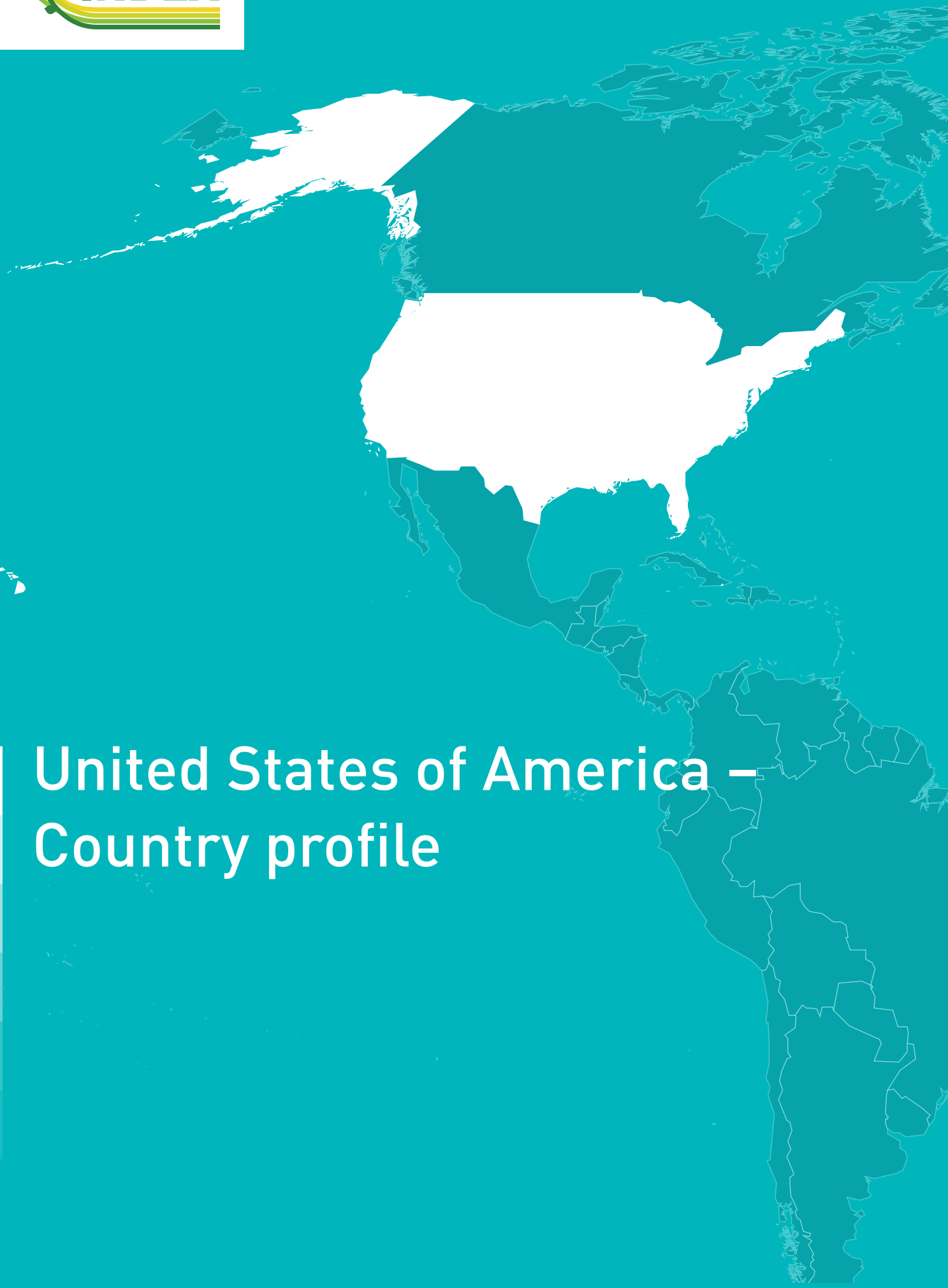
AGROBIODIVERSITY INDEX

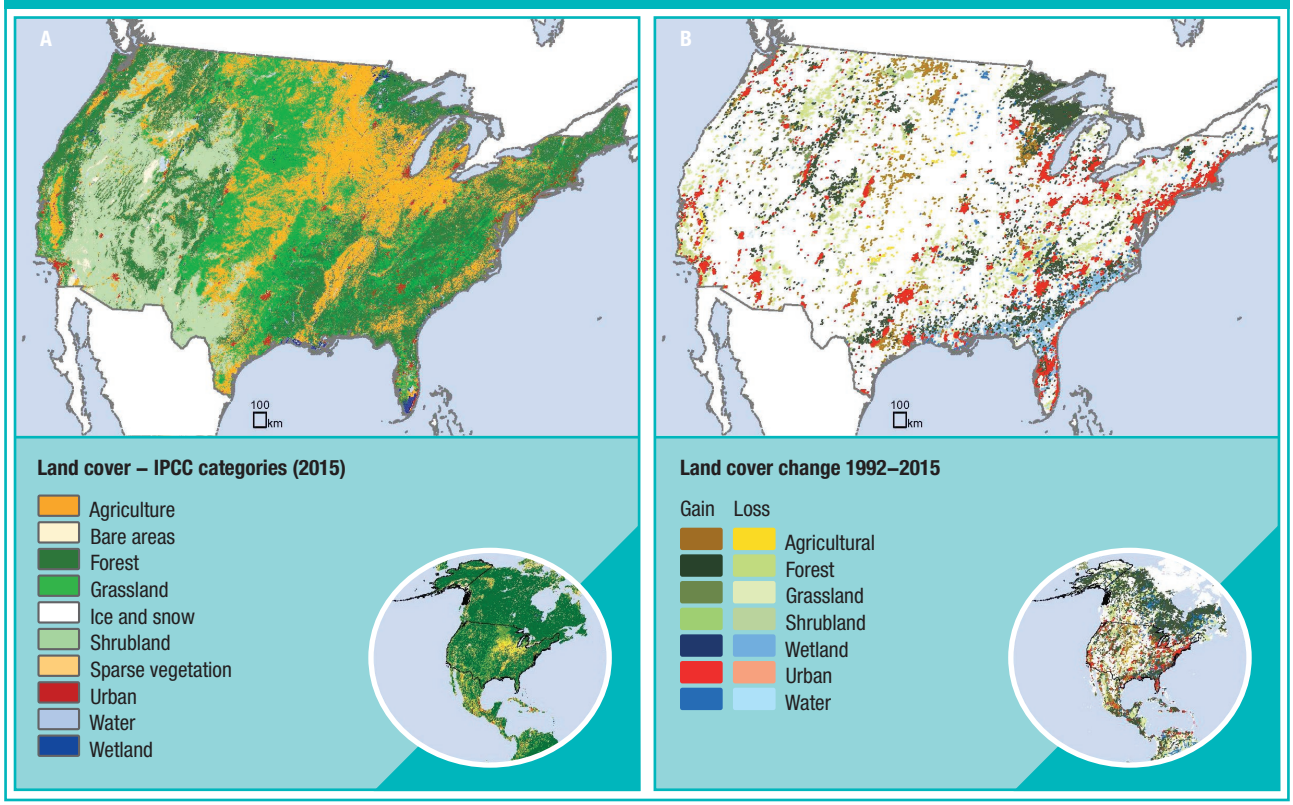


United States of America – Country profile

Context

- In the USA, agriculture and pasture occupy about 44% of the total land area (Figure 1A) and provide about 1.4% of employment. In 2017, this sector contributed to approximately 1.0% of gross domestic product.[i] The USA is a major producer of maize as feed grain, cotton, soybeans, fruit, sugar, vegetables and nuts.
- Among adults, the mortality rate attributable to inadequate diets is 171 per 100,000 population.[ii] Overall consumption of food groups is too low for vegetables, fruits, whole grains, nuts and seeds, and too high for processed and red meats, and sugar-sweetened beverages.[iii]
- The USA hosts one of the four major national genebanks in the world at the National Center for Genetic Resources Preservation, with over 580,000 crop samples. The USA is home to roughly 13% of native species identified worldwide and crop wild relatives, and has three biodiversity hotspots: the California Floristic Province (spanning from California to Oregon), the Madrean Pine-Oak Woodlands (in Arizona, New Mexico and Texas) and the North American Coastal Plain.[iv, v]
- Major changes in land use include urbanization and reforestation (Figure 1B).
- The IUCN Red List estimates that in 2015 around 1,300 species across taxa were threatened in the country due to various reasons, including those directly or indirectly related to agriculture.[vi] Over the past 35 years, crop diversity has decreased considerably due to many factors, including the expansion of corn, wheat, soybeans and upland cotton production systems.

FIGURE 1 – Major land use (A) and changes in major land use (B)



Source: Adapted from: A) European Space Agency 2017;[vii] B) Nowosad, et al. 2019.[viii]

Agrobiodiversity Index results

- The USA scores medium for the present **status** of agrobiodiversity. Agrobiodiversity in genetic resource management for future options contributes most strongly to the status score, followed by agrobiodiversity in markets and consumption for healthy diets and agrobiodiversity in production systems for sustainable agriculture.
- The **progress** score appears to be low. In fact, specific targets with time-bound thresholds for conservation or sustainable use of the available agrobiodiversity are mostly missing in the sources analyzed. On the positive side, the USA shows a strong commitment to increasing the number of healthy people. The country is also putting in place strong actions to diversify production, through crop–livestock systems, and to incorporate agrobiodiversity in production systems for sustainable agriculture.
- Compared to the 10-country average, the USA scores below average in both status and progress scores. The country's increasing focus on health and nutritious food can trigger public demand that helps unlock the potential of agrobiodiversity along the value chain, from genetic resource management to production and consumption.

FIGURE 2 – Overview of Agrobiodiversity Index scores for the USA

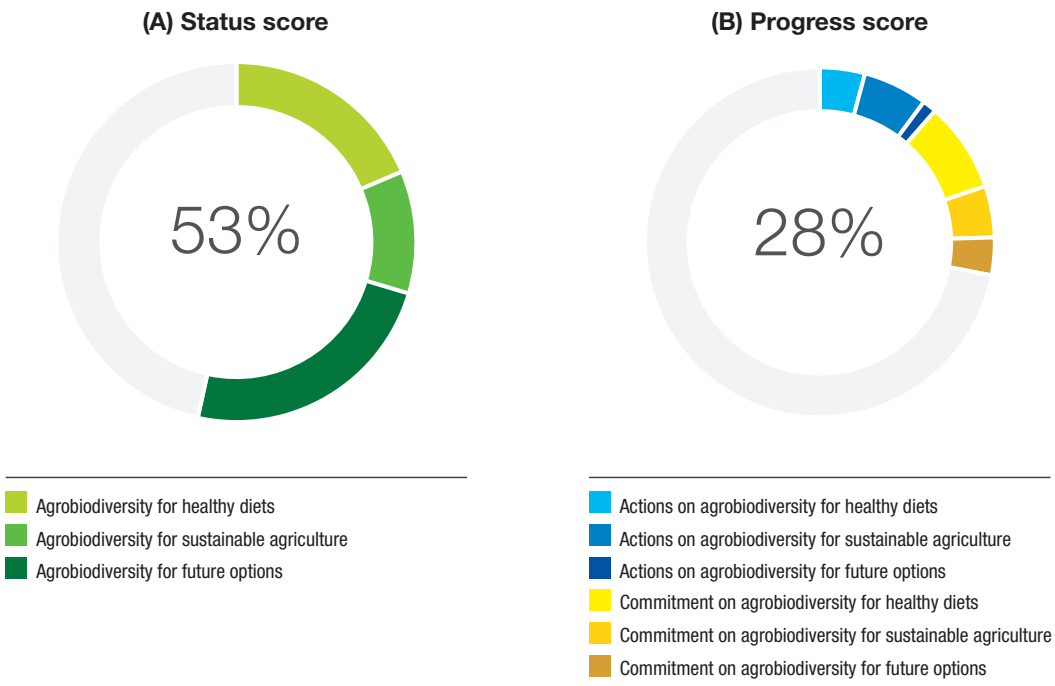


TABLE 1 – Overview of the agrobiodiversity indicator scores per pillar for the USA

		Pillar 1	Pillar 2	Pillar 3
		Agrobiodiversity in markets and consumption for healthy diets	**Agrobiodiversity in production for sustainable agriculture**	**Agrobiodiversity in genetic resource management for future options**
Commitment	Level of commitment to enhancing consumption and markets of agrobiodiversity for healthy diets	50		
	Level of commitment to enhancing production and maintenance of agrobiodiversity for sustainable agriculture		29	
	Level of commitment to enhancing genetic resource management of agrobiodiversity for current and future use options			21
Actions	Consumption and market management practices supporting agrobiodiversity	25		
	Production practices favouring agrobiodiversity		21	
	Production diversity-based practices		51	
	Genetic resource management practices supporting agrobiodiversity			8
Status	Species diversity	86	30	97
	Varietal diversity			99
	Functional diversity	25		
	Underutilized/local species	56		19
	Soil biodiversity		26	
	Pollinator biodiversity			
	Landscape complexity		43	

Note: All scores are scaled from 0–100. The colour scheme was changed on 1 August 2019 to reflect more accurately the scores

Leading practices

- ***Ex situ* and *in situ* conservation:** The USA hosts one of the four major national genebanks in the world at the National Center for Genetic Resources Preservation, with about 580,000 crop samples. The country is home to about 13% of native species identified worldwide, and to many crop wild relatives. It hosts three biodiversity hotspots: the California Floristic Province (spanning from California to Oregon), the Madrean Pine-Oak Woodlands (in Arizona, New Mexico and Texas) and the North American Coastal Plain.
- **Crop–livestock combinations in agricultural landscapes:** Around 89% of agricultural land in the USA integrates crop and livestock production. Such integrated systems can contribute to more closed and efficient nutrient cycles, soil fertility, and diversified and resilient production system.
- **Agrobiodiversity in supply systems for healthy diets:** Commitments to improving diet diversity can be seen from the Healthy People 2020 initiative, managed by the Disease Prevention and Health Promotion Office at the United States Department of Health and Human Services. This includes increasing public awareness, access to retail outlets selling a wider variety of foods, and public procurement through provision of nutritious foods in schools.

Areas for improvement

- **Agrobiodiversity for more sustainable agriculture:** Simplification and intensification of agricultural landscapes in the USA increase risks of land degradation, losses due to climate change, biodiversity loss and rural poverty. The maps in Figure 5 show that in many cases the number of species per land unit are five or lower in large agricultural areas in the country.
- **Management of natural vegetation in agricultural landscapes:** About 43% of agricultural land includes more than 10% of natural or semi-natural vegetation, suggesting that agriculture is quite interconnected with the surrounding ecosystem, but this relationship can be improved. The country could benefit from active management of such areas to achieve both agricultural and environmental sustainability.
- **Avoiding overuse of fertilizers and pesticides:** Chemical control mechanisms in agriculture are highly used. Five crops – corn, cotton, fall potatoes, soybeans and wheat – account for nearly two-thirds of the volume of pesticide applied. In the USA, total fertilizer use in agriculture rose rapidly from 1950 to 1980, then started leveling off. Since 1980, nitrogen use has increased at a more modest rate while phosphate and potash use declined slightly.[ix]

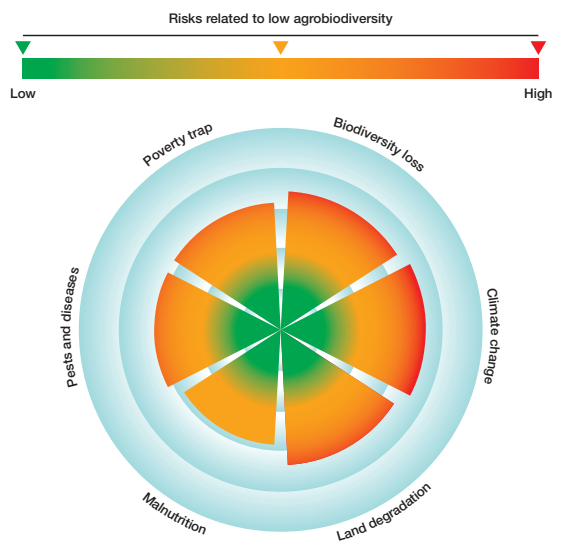
Notable findings

- ***In situ* conservation of pollinators:** The USA's National Strategy to Promote the Health of Honey Bees and Other Pollinators aims to improve pollinator habitat and reduce stressors affecting pollinators. The Conservation Stewardship Program (CSP) provides long-term stewardship payments to landowners who implement advanced conservation systems. As of 2015, nearly 3,000 CSP contract holders had established pollinator habitats in non-cropped areas on their lands.[x]
- **Genetically modified crops:** In parts of the USA where genetically modified glyphosate-resistant crop cultivars have been adopted, this has led to a simplification of landscapes as crop rotation has declined.[xi] On the other hand, the USA reports that the use of genetically modified crops, such as Bt maize, has led to a decrease in the application of insecticides, and that the use of herbicide-tolerant varieties has increased levels of adoption of conservation agriculture.[xii]
- **Increased efficiency through technologies:** Using technologies such as precision agriculture is recognized as a strong strategy for reducing unwanted negative effects from agriculture. The USA can play a pioneering role in extending the potential of such technologies to transition from shallow sustainability to deeper regenerative agriculture.

Risk assessment

Multiple risks are elevated because of certain low agrobiodiversity patterns (Figure 3). The combination of low species diversity in production, limited natural vegetation in agricultural land, and low soil biodiversity increases the risks of losses due to climate change and land degradation.

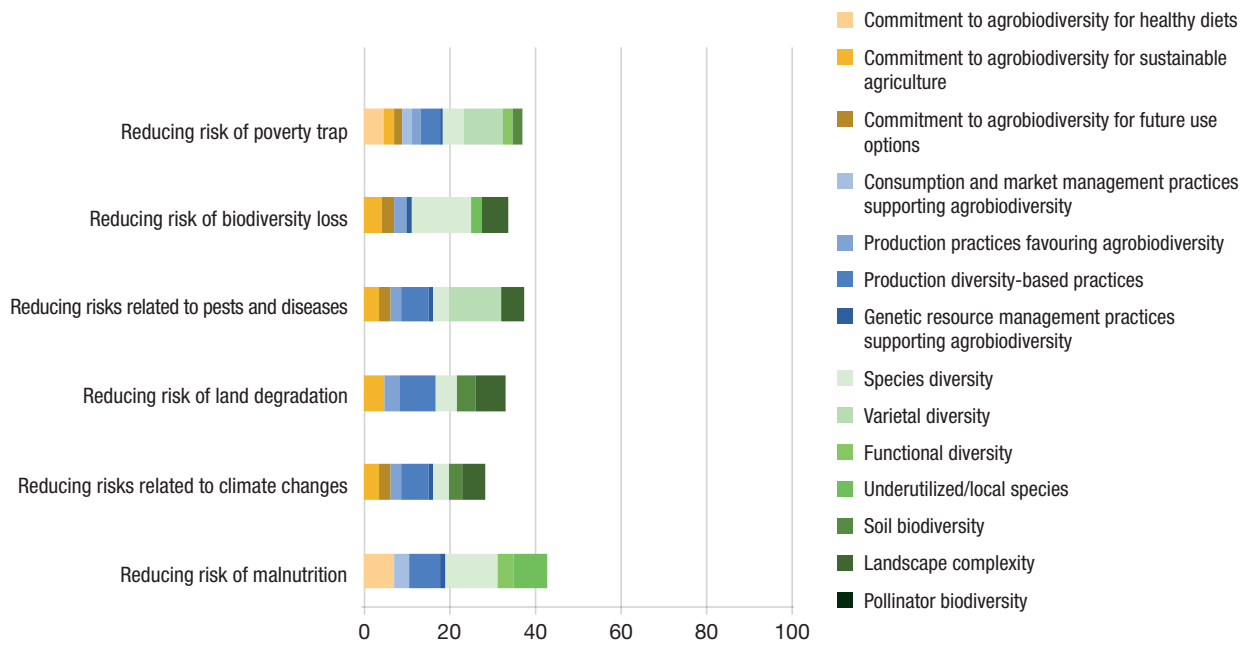
FIGURE 3 – Increased risks related to low agrobiodiversity levels in USA



Resilience building

Reversing the risk assessment, the existing agrobiodiversity and related actions and commitments help build resilience to various risks (Figure 4). Current agrobiodiversity management in the USA contributes most significantly to managing risks related to malnutrition, through the use of species diversity as well as underutilized and local species.

FIGURE 4 – Contributions of Agrobiodiversity Index indicators to resilience building in the USA



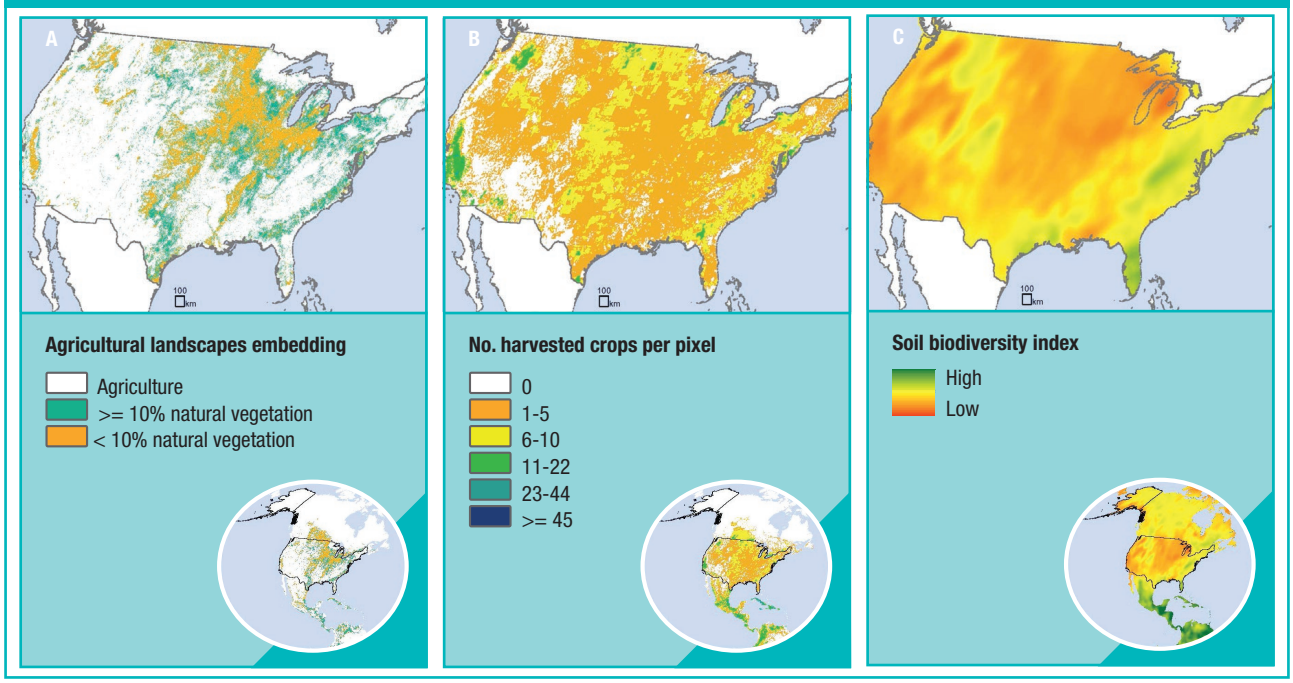
Note: All scores are scaled to a maximum of 100. Colours indicate relative scores of individual agrobiodiversity indicators that contribute to building resilience for that specific risk area. No data available for pollinator biodiversity.

Indicator trends

Spatial trends

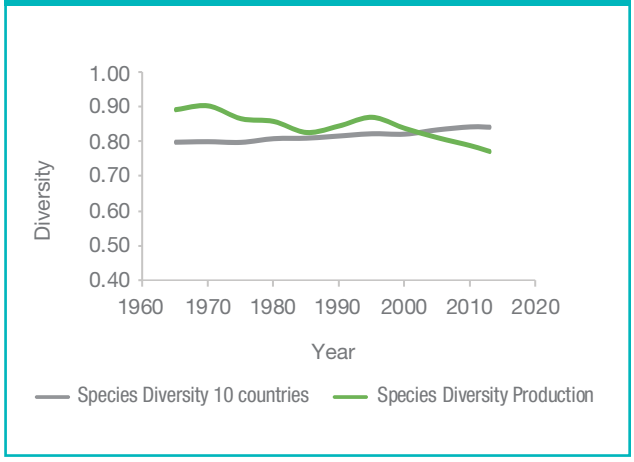
In the USA, 43% of agricultural land contains a minimum of 10% of natural or semi-natural vegetation (Figure 5A), suggesting that agriculture is not well interconnected with natural vegetation. Improving the management of this relationship between agriculture and natural vegetation can contribute to agricultural and environmental sustainability. Low numbers of crop species harvested per pixel suggest that simplified production systems strongly dominate the country, with a few higher values on the lower West Coast (Figure 5B). The soil biodiversity index (Figure 5C) is low across the country compared to other countries, with higher values in some areas on the East Coast. This flags increased risk of soil degradation.

FIGURE 5 – Spatial trends in agrobiodiversity indicators for sustainable agriculture, including agricultural land with >10% natural or semi-natural vegetation (A); number of harvested crops per pixel (B), and soil biodiversity index (C)



Source: Adapted from: A) European Space Agency 2017; B) Monfreda et al. 2008;[xiii] C) European Soil Data Center 2016.[xiv]

FIGURE 6 – Temporal trends in species diversity in production in the USA (Shannon diversity index)



Source: FAO, 2019[xv]

Temporal trends

Species diversity in USA's agricultural production has been declining between 1965 and 2013 (Figure 6). This decline is mainly explained by the strongly increased dominance of maize, in terms of production quantity and land area, and secondly soybeans. Species diversity in total import and export have increased over this same period.

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