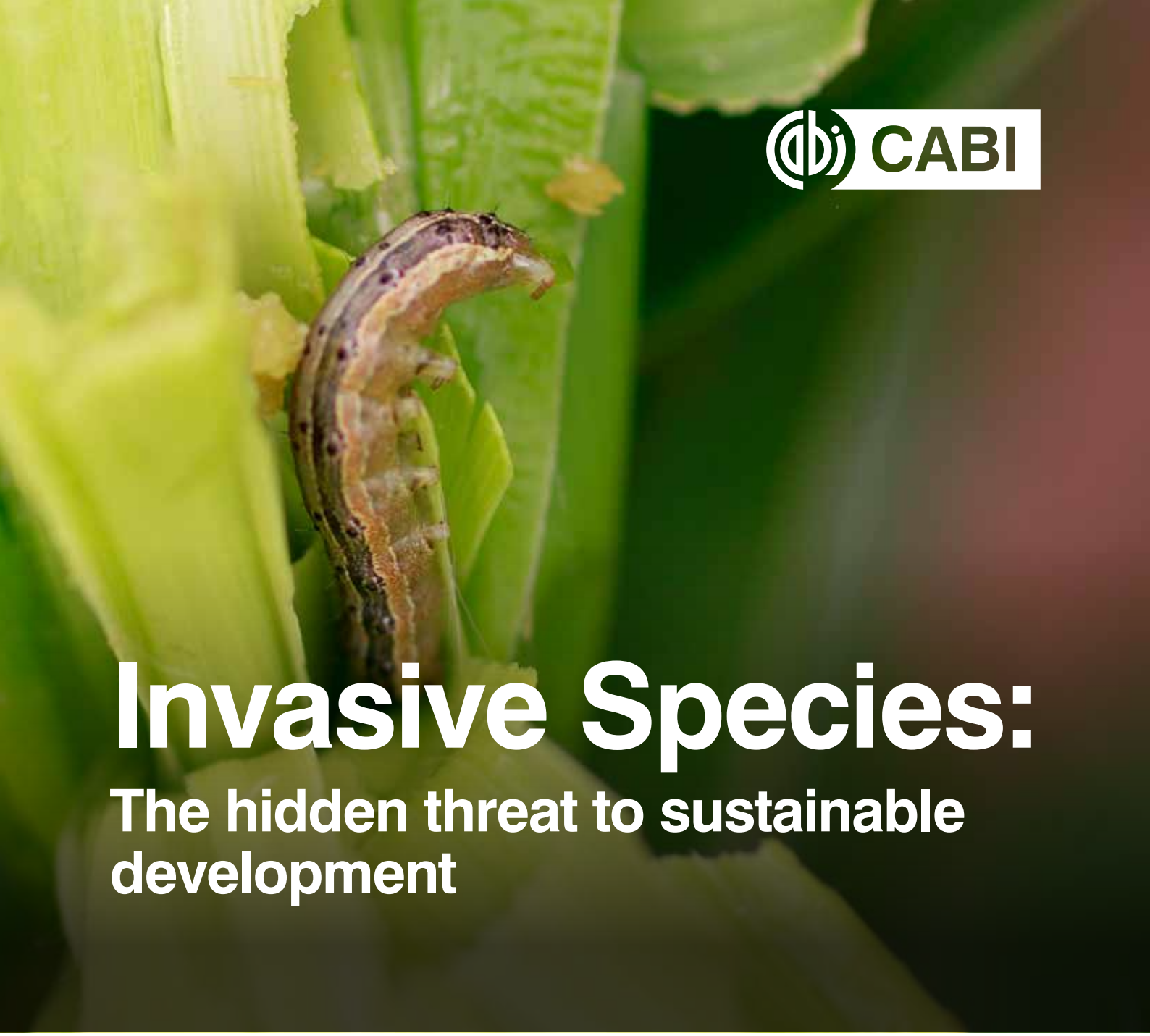


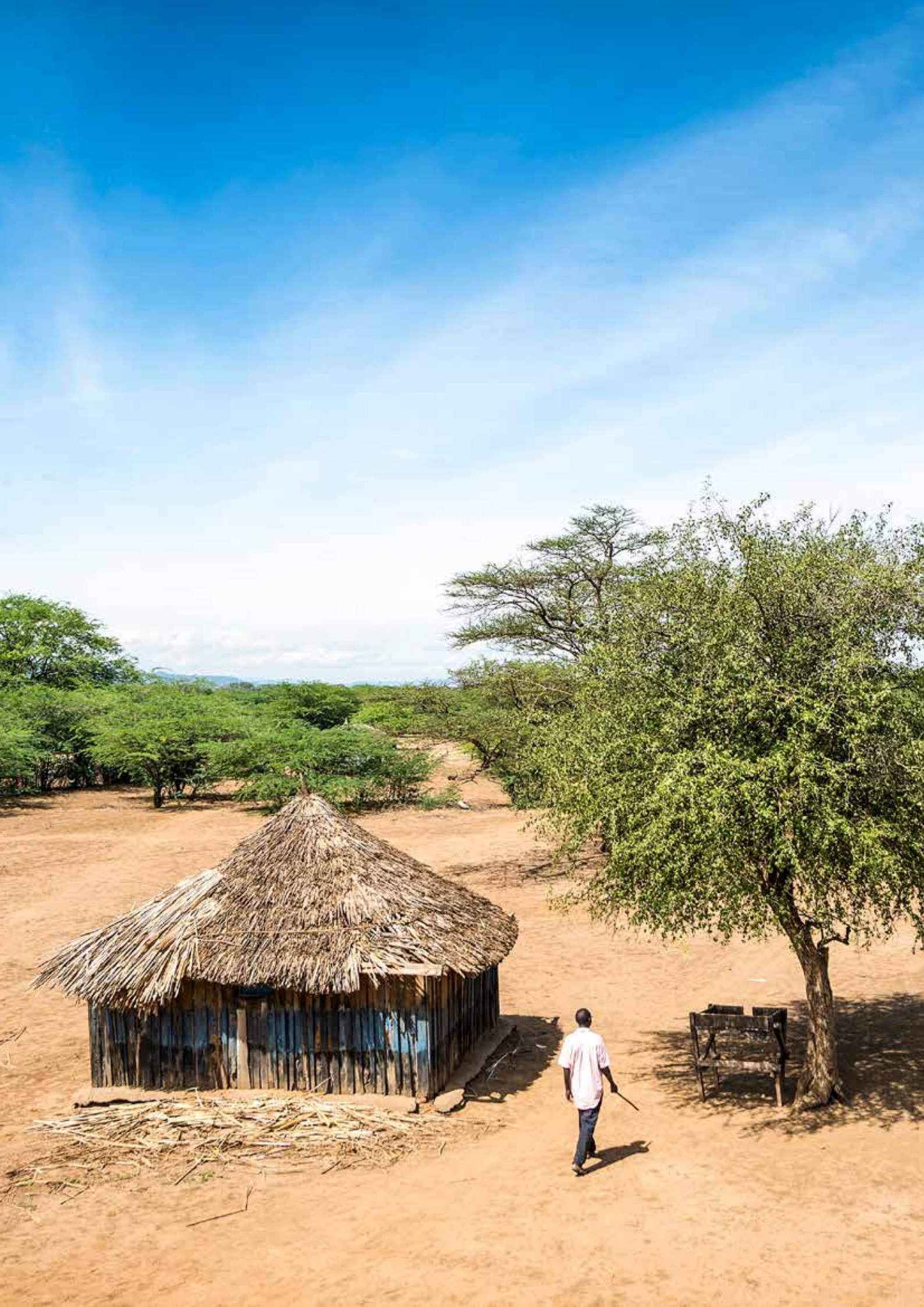
Invasive Species:

The hidden threat to sustainable development

This policy and media briefing is an outline of the impact of invasive species and their effect on delivering the Sustainable Development Goals, along with an action plan encompassing CABI's recommendations.

Acknowledgement

We gratefully acknowledge the core financial support from our member countries and lead agencies including the United Kingdom (Department for International Development), China (Chinese Ministry of Agriculture), Australia (Australian Centre for International Agricultural Research), Canada (Agriculture and Agri-Food Canada), Netherlands (Directorate-General for International Cooperation), and Switzerland (Swiss Agency for Development and Cooperation)..



Dr Dennis Rangi
CABI's Director General, Development

Message from CABI's Director General, Development

Preparing for the next major invasive species outbreak

The recent outbreak of fall armyworm in Africa is now affecting at least 44 countries and in research funded by the UK's Department for International Development (DFID), CABI estimated this pest could cost just 12 of Africa's major maize-producing economies a total of US$2.5 billion to US$6.2 billion a year in lost maize harvests, if left unmanaged.

This is a reminder of how vulnerable some parts of the world still are to invasive species and how devastating they can be. The fall armyworm has now also been found in India, and CABI fears the food security of millions could be put at risk if it spreads further across Asia.

Almost 20 years ago, the Global Invasive Species Programme (GISP) published ten strategic responses to the problem, encouraging the international community to take urgent action. One of these was the need for every country to prepare national strategies and plans for dealing with potential outbreaks. So why weren't we better prepared for fall armyworm? Are we making progress fast enough? Are we on track to meet the targets for invasive species set by the United Nations?

The international community set itself the ambition of achieving the Sustainable Development Goals (SDGs) by the end of the next decade, but we will fail to achieve many of these unless we make significant progress on invasive species. In SDG 15, a specific target was set to "introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species" by 2020. So how prepared were many of the African countries who have been affected by fall armyworm? How vulnerable are other countries to a future armyworm–type outbreak? And, particularly in light of the news from India, are we running out of time to meet this target in the next three years?

This briefing is a timely reminder of the impact of invasive species; how this growing, global problem is undermining our ability to achieve the SDGs, and highlights the need for all countries to make much faster progress in implementing vital recommendations and achieving targets on invasive species.

The challenge of realising the 17 United Nations SDGs means that development organisations often focus just on a particular subset of the goals. If you are working on poverty, health or water, why should you care about a few bugs or weeds cropping up where they shouldn't? The reality is that millions of the world's most vulnerable people face problems with invasive weeds, insects, plant diseases and animals, which are out of control and have a major economic, social and environmental impact. Invasive species are therefore fast becoming a critical factor in preventing us achieving many of the SDGs, with the global cost of the world's invasive species estimated at US$1.4 trillion per year – close to 5% of global GDP.

That's why we recently launched our US$50m global Action on Invasives programme with the aim of protecting and improving the livelihoods of 50 million poor rural households affected by invasive species. Help us win the fight against invasive species and meet the SDGs.

Dr Dennis Rangi

A growing global threat

The threat

Invasive species are species whose introduction and spread threaten biological diversity or have other unforeseen impacts. They are generally species that have been introduced by human action to areas outside their natural range and, have become established in a new ecosystem.

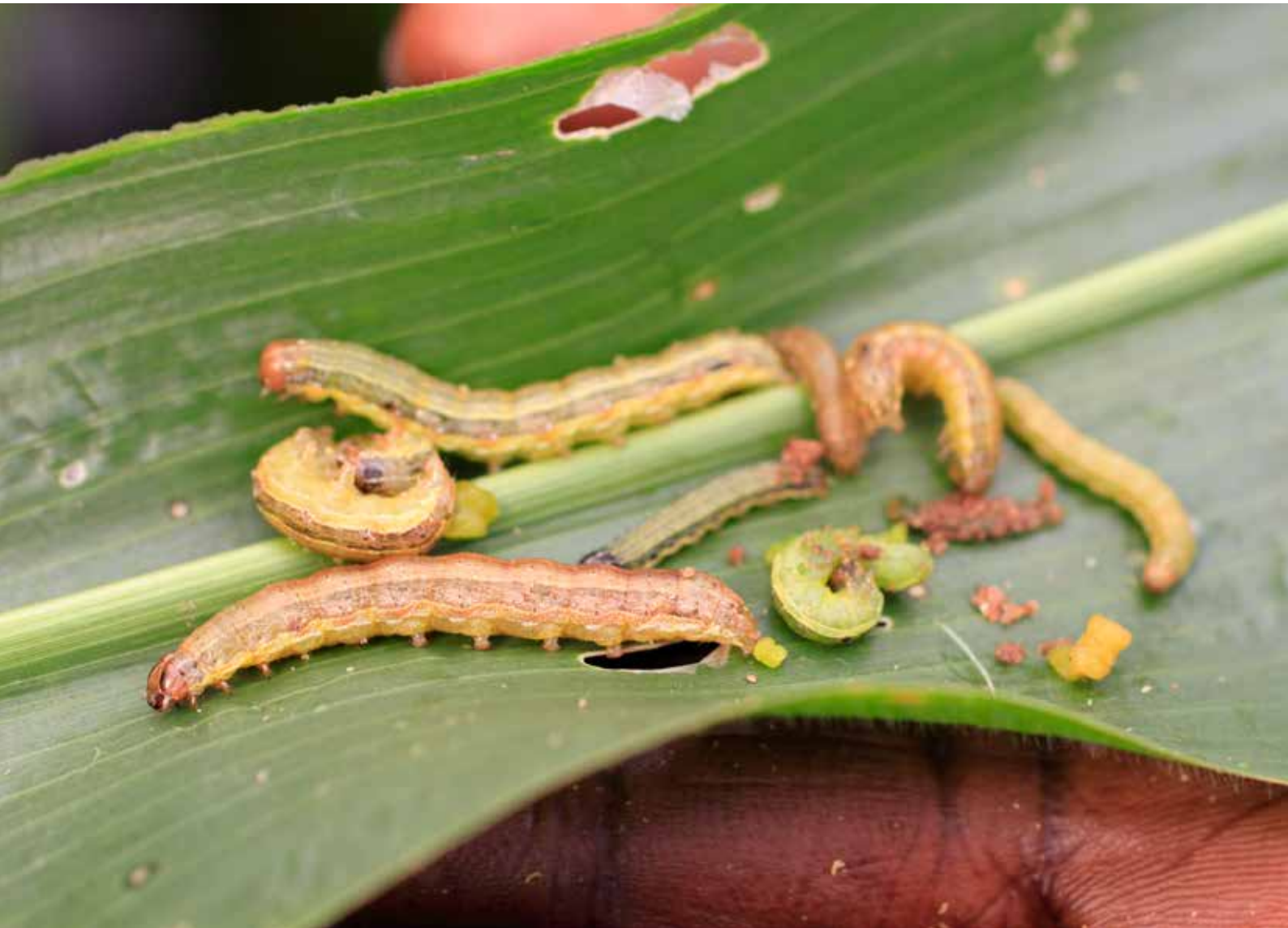
Invasive species pose a huge global threat, both in terms of biodiversity and the cost to economic activities such as agriculture, tourism and development.

They disproportionately affect communities in poor rural areas; people who depend on natural resources and healthy ecosystems to make a living. For example, an invasive weed can take over grazing land and out-compete crops for limited resources. This can significantly affect yields and production as easily as invasive insect pests and diseases. Invasive species can also harm the health of people in infected areas.

Over half of the world's food comes from just three crops - rice, wheat and maize. CABI estimates that these three crops alone suffer annual yield losses of up to 16% (i.e. US$96bn of lost production) due to invasive species.

It is estimated that 480,000 invasive species have been introduced to different ecosystems globally. Unfortunately, their geographic spread and impact is growing due to climate change, trade and tourism. There has been an unprecedented rate of new introductions in recent years, as well as a rapid expansion of existing biological invasions.

Invasive species destroy livelihoods, cause hunger, threaten the economic prosperity of entire countries and regions, and increase biodiversity loss. Urgent action is required if we are to achieve the UN's vision of achieving food security and sustainable agriculture, economic growth and prosperity, and protecting our ecosystems.



The victims

Invasive species disproportionately affect vulnerable communities in poor rural areas, especially in developing countries, who depend on natural resources, healthy ecosystems, trade and tourism for their livelihoods. Invasives drive food insecurity and undermine ongoing investments in development. Sub-Saharan Africa has been shown to be the most vulnerable region in the world for damage caused by invasive species.

Smallholder farmers in developing countries suffer most from the impact of invasives: small farms represent 80% of all farms in sub-Saharan Africa (approximately 33 million in number) and in some countries contribute over 90% of national production. Furthermore, almost 70% of the world's poor reside in rural areas, with poverty now exacerbated by invasive species which can affect many of the crops that they grow. Smallholders typically grow a mixture of subsistence and cash crops and, in some regions, households also harvest natural resources such as grasses and shrubs for animal fodder.

How do they spread?

The four Ts: trade, transport, travel and tourism can lead to new biological invasions. Species are able to 'hitch-hike' in travellers' luggage and clothing, in freight and packaging, be introduced through contaminated animals and plants, or through ships' ballast water and other waste material when dumped.

Humans have always transported species as they traverse the world. Today, modern transport systems and global economic trade mean people are moving species at unprecedented rates across ecological barriers and political borders.

Five invasive species devastating Africa

A number of invasive species have been damaging crops since their introduction to Africa, causing severe losses for smallholder farmers. These attack important staples such as maize, but also high-value and nutritious crops such as fruits, vegetables and pulses.:

- Fall armyworm (Spodoptera frugiperda), is a moth indigenous to the Americas and one of the most damaging pests – feeding on over 80 different crops,including maize, rice, sorghum and sugarcane. In Africa, unless controlled, it has the potential to cause maize yield losses estimated at between US$2.5 billion to US$6.2 billion a year, in just 12 of Africa's maize-producing countries.
- The South American tomato leaf miner (Tuta absoluta) has had a major impact since its arrival in Africa. Losses to eastern African smallholders are estimated at up to US$80 million per year at present, but this figure is expected to grow substantially with its rapid spread.
- As much as US$450 million is lost to smallholders each year to the spotted stem borer (Chilo partellus), a caterpillar which feeds inside the growing maize plant, reducing its yield.
- Maize Lethal Necrosis Disease (MLND) is caused by a dual viral infection and leads to the production of deformed maize ears which can result in total crop loss. Current smallholder losses to this disease are estimated to be up to US$340 million each year but could increase significantly if the disease spreads further.
- The invasive 'famine weed', Parthenium hysterophorus, affects farmland and pasture, reducing production levels in a variety of crops and affects human and animal health. The weed is most widespread in Ethiopia but is increasing its range in Kenya, Tanzania and Uganda. Current smallholder losses in maize for the region are estimated to be as high as US$82 million annually, but again this is expected to rise if the ongoing march of this damaging weed is not checked.

Endangering the Sustainable Development Goals

The fall armyworm crisis clearly demonstrates the urgent need to make faster progress in dealing with invasive species. The international community set itself the ambition of achieving all SDGs by the end of the next decade, but we will fail to achieve many of these unless significant progress is made on dealing with invasive species. In SDG 15, a specific target was set to "introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species" by 2020.

Widespread impact across all SDGs

Seventeen SDGs were adopted by world leaders in 2015. Over the next 15 years, they will mobilise efforts to end all forms of poverty, fight inequalities and tackle climate change, while ensuring that no one is left behind. They aim to improve the lives of everyone everywhere. The threat posed by invasive species is not limited to agriculture – they have a significant impact on almost all SDGs, making them a critical factor in preventing progress towards the global sustainable development agenda.

Examples of some of the most serious impacts include:

- Higher production costs and reduced yields lead to lower incomes and increased poverty [SDG1]. Yield losses to invasive species such as Tuta absoluta, fall armyworm or Parthenium have been known to reduce crop yields by over 90%, with devastating results for smallholder farmers.
- Reduced crop yields and higher food prices have a direct impact on food security [SDG2]. Staples such as maize and rice are severely threatened by the spread of the fall armyworm. In Nigeria, the 2016 outbreak of Tuta absoluta made tomatoes – a nutritional staple – unaffordable for most of the population.
- Invasive species cause a variety of health problems [SDG3]. Parthenium can cause respiratory problems and dermatitis in humans. Floating mats of water hyacinth are a habitat for

mosquitoes, increasing the spread of mosquito-borne diseases.

- Children and women are disproportionally affected by invasive species [SDG4 & SDG5]. Weeding is still done by hand in many countries and is often left to women and children. Children's education is negatively impacted when they spend less time in school to work in the fields.
- Invasive species reduce water quality and impact aquatic biodiversity [SDG6 & SDG14] Aquatic weeds such as water hyacinth, Salvinia molesta and Pistia stratiotes, disturb freshwater systems, block waterways and diminish fish stocks by reducing water quality. In arid regions, the roots of Prosopis grow so deep they disrupt the water supply to households, agriculture and industry.
- Invasive species block infrastructure, impact trade and lead to reduced employment opportunities [SDG8 & SDG9]. Reduced yields have an impact all along the value chain, with fewer jobs both in the field and in post-harvest processing. Serious infestations stop rural communities accessing markets and services, choke irrigation canals and hydroelectric schemes, and make an area less attractive to tourists. The presence of invasive pests and diseases can be a barrier to overseas trade due to quarantine regulations. Some countries have already banned the import of fruits from Africa due to the fruit fly Bactrocera dorsalis.
- Invasive species impact the environment and biodiversity [SDG13 and SDG15]. Invasive species contribute to desertification and make communities and natural habitats more vulnerable to the effects of climate change. They are the second greatest threat to biodiversity after habitat loss and can reduce native plant richness by up to 90%.

Damaging economic growth

SDG 8 aims to promote sustained economic growth. The damage from invasive species worldwide is estimated at more than US$1.4 trillion per year, which represents nearly 5% of the global economy. Tackling this issue is critical to achieving widespread economic prosperity and combating poverty in some of the world's poorest developing countries. Pests, diseases and weeds cause devastating losses in wheat, rice, maize, potatoes, soybeans, and cotton – six of the world's most economically important crops.Up to 40% of crops are lost to pests and diseases.

Increasing poverty and hunger

SDG 1 aims to end poverty everywhere. Research by CABI has demonstrated that just five invasive species are causing up to US$1.1 billion in economic losses to smallholder farmers across six eastern African countries each year. This equates to around 2% of total agricultural GDP for the region. These six countries (Ethiopia, Kenya, Malawi, Rwanda, Tanzania and Uganda) have large rural communities dependent on small-scale farming for food security and income. If they are not managed effectively, the losses are expected to grow over the next five to ten years.

Disrupting biodiversity and ecosystems

SDG15: Life on Land aims to halt the loss of biodiversity and protect and prevent the extinction of threatened species. By 2020, it aims to introduce measures to prevent the introduction and significantly reduce the impact of invasive species on land and water ecosystems and control or eradicate priority species.

Invasive species are a major driver of biodiversity loss. Analysis of the IUCN Red List shows they are the second most common threat to extinction of a species and, in the case of amphibians, reptiles and mammals, the most common cause.

The effect of invasive species on habitat loss has a direct impact on the dwindling numbers of iconic species, including elephants and lions. They reduce the amount of available productive land, putting people into conflict with wildlife in protected areas, increasing poaching which in turn has a knock-on effect on tourism earnings. The recently-launched Global Registry of Introduced and Invasive Species has estimated that 25% of invasive species negatively impact biodiversity and ecosystems.

Research has demonstrated that plant invasives are characterised by the ability to outcompete native species and change the biodiversity, community structure, and ecosystem of a region. Their traits include: rapid growth, short life cycles, prolific seed production, seed dormancy with staggered germination, toleration of a wide range of environmental conditions, generalist pollinators, varied reproductive strategies and efficient dispersal abilities.

Tackling climate change

Climate change is now evident in every country on every continent, disrupting economies and affecting lives. *SDG13 aims to 'take urgent action to combat climate change and its impacts'*. Invasive species are a major factor as they exacerbate the impact of climate change preventing communities from being able to cope with its effects and reducing resilience.

Climate change facilitates the spread and establishment of many non-native species and creates new opportunities for them to become invasive, while reducing the resilience of habitats to biological invasions.

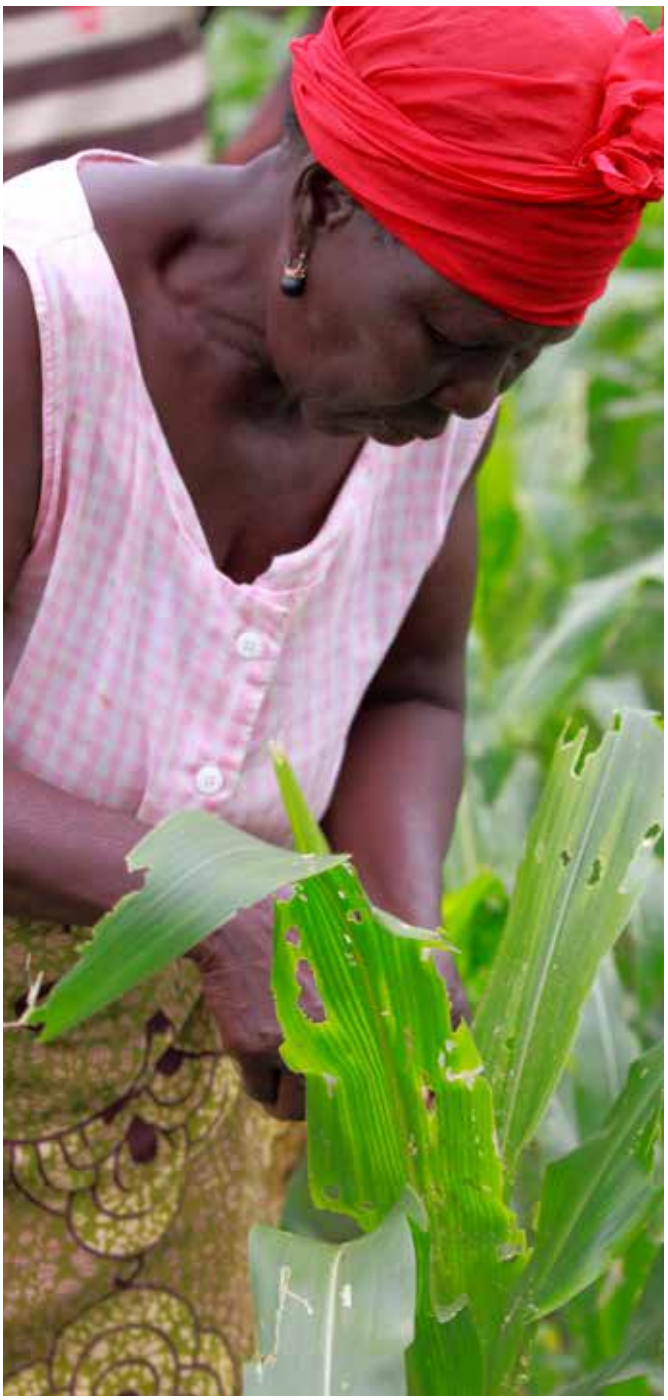
Case Study: fall armyworm in Africa

The fall armyworm - a moth indigenous to the Americas – has spread rapidly across Africa, infesting 44 or more countries in less than 2 years. It has also been recently found in India, and will probably spread to other countries in Asia soon. One of the Americas' most damaging crop pests, it feeds on over 80 different crops, including maize, rice, sorghum and sugarcane, as well as cabbage, beet, peanut, soybean, alfalfa, onion, cotton, pasture grasses, millet, tomato, potato and cotton.

Rapid spread

The first confirmed reports of fall armyworm were from West Africa in early 2016. Research to date suggests that both strains entered Africa, perhaps as stowaways on commercial aircraft, either in cargo containers or airplane holds, before subsequent widespread dispersal by the wind.

The impact fall armyworm has on maize yields in Africa has been, and is likely to continue to be, significant. Fall armyworm is capable of migrating long distances on prevailing winds, but it can also breed continuously in areas that are climatically suitable.



Hunger and Poverty

Fall armyworm in Africa has the potential to cause maize yield losses of up to 20.6 million tonnes per annum in just 12 of Africa's maize-producing countries. This represents nearly 53% of annual production. The value of these losses is estimated to be up to US$6.2 billion. Maize accounts for almost half of the calories and protein consumed in eastern and southern Africa and one-fifth in West Africa.

Maize is the most important staple cereal crop grown by smallholders in sub-Saharan Africa and is the dominant cereal grown in most other African countries. It is grown across diverse agro-ecological zones where over 200 million people depend on the crop for food security. The fall armyworm's arrival in India has now given rise to fears for the food security of millions of people across Asia.

Responding to the Crisis

Despite international consensus on what needs to be done and embedded targets in SDGs, progress has been too slow to prevent invasions. CABI believes the international community needs a renewed commitment to implementing change and investing in measures that will help countries become better prepared to handle the impact of any new invasive species outbreak.

Three Key Areas

There is a straightforward, three-pronged, internationally recognised approach to addressing the problem of invasive species:

- **Prevention:** developing and implementing biosecurity policies to prevent the arrival and spread of invasive species and raising awareness of potential threats at a local level.
- **Early detection and rapid response:** building capacity to develop and implement surveillance and emergency action plans for detecting and eradicating new invasions.
- **Control**: scaling up existing invasive species management solutions; embedding control options in policy; and making sure that those living in rural communities have access to best practice and locally adapted solutions and are actively engaged in their implementation.

However, this framework requires commitment across sectors and borders, at both micro and macro levels. Just as neighbouring farmers need to work together to ensure a pest does not cross from one plot to the next, so countries must also act together. This needs to be acknowledged across both public and private sectors.

The solution is already embedded in the goals themselves. SDG17: Partnerships for the Goals explicitly requires organisations to change a silo approach to collaboration across sectors. Incorporating biosecurity and invasive species management considerations into development work could have a major impact in mitigating invasive species' threat to sustainable development.

Ten Strategic Responses

In 2001, the Global Invasive Species Programme set ten strategic responses for tacking invasive species:

1. Build management capacity
2. Build research capacity
3. Promote sharing of information
4. Develop economic policies and tools
5. Strengthen national, regional and international legal and institutional frameworks
6. Institute systems for environmental risk analysis
7. Build public awareness and engagement
8. Prepare national strategies and plans
9. Build IAS issues into global change initiatives
10. Promote international cooperation to deal with the problems of invasive species

The recent fall armyworm outbreak clearly demonstrated that although some progress has been made in these areas, there is still much more to do. Data, information sharing, and planning at national and international levels are not sufficiently advanced to help prevent or mitigate major outbreaks.

A key recommendation in the GISP strategy was to improve information that could alert management agencies to the potential dangers of new introductions including an early warning system. Twenty years later, good information on exactly what losses are being suffered in each territory is still difficult to access and there is no effective global overview to track the problem.

The strategy also highlighted an urgent need for all countries to prepare national strategies and plans to better prepare for the devastating impact of an outbreak on nationally important crops. Whilst some countries have developed plans for dealing with invasive species, these are often not fully integrated across government.

We are gradually falling behind and progress is currently too slow to achieve the ambitious targets set by the international community. If we do not accelerate progress on these critical issues, further outbreaks cannot be prevented.

Action Plan to 2020

To accelerate progress, and help to prevent another fall armyworm-type outbreak, CABI recommends five urgent action areas which must be implemented before 2020 to make any real difference:

1. National strategy and planning: every country must ensure it has an invasive species strategy and action plan in place by 2020 as agreed by the Conference of the Parties to the CBD – an integrated approach across all sectors and policy areas.
2. National hit list: every country should have a priority list which identifies their highest risks from invasive species and target national efforts to ensure they are prepared for any potential outbreak.
3. Harness big data: we need much better global information on exactly what losses are suffered in different countries due to invasive species. We urgently need an international effort to create a data tracking mechanism to help all countries understand the true impact of invasive species, enable them to direct government funding to tackle it and help them monitor the return on this investment.
4. Increase investment: all countries must increase their investment in tackling invasive species and make it a cross-government priority.
5. Encourage lower risk management methods: countries should develop policies and regulations that encourage the use of lower risk management methods (eg biocontrol, integrated pest management etc).

CABI's Invasive Species Programme

US$50M Programme to tackle invasive species

In response to the threat of invasive species, CABI has this year launched a unique, global programme with the aim to protect and improve the livelihoods of 50 million poor rural households affected by invasive species. The Action on Invasives programme is championing an environmentally sustainable, cross-sectoral and regional approach to dealing with invasive species.

The programme brings together CABI's 100-year track record in invasive species management, strengthening of plant health systems and delivery of practical and authoritative knowledge and solutions into the hands of everyone affected – from farmers to policy-makers. The ultimate goal is to enable developing countries to prevent or detect and control invasive species in order to protect and restore agricultural and natural ecosystems, reduce crop losses, improve health, remove trade barriers and reduce degradation of natural resources, infrastructure and vulnerable areas.

With support and funding from the UK's Department for International Development (DFID) and the Netherlands' Directorate-General for International Cooperation (DGIS), the programme has been piloted in Ghana and Pakistan on specific species and is now being scaled up so people around the world can fulfil their true potential and help their countries prosper. CABI and its partners are therefore seeking a US$50m investment to coordinate the programme and implement a multinational invasive species framework.

CABI believes the Action on Invasives programme will contribute to improving people's livelihoods and food security, as well as countries' trade opportunities and commitment to environmental protection. This in turn will support the United Nation's SDGs, the International Plant Protection Convention and the Convention on Biological Diversity. CABI is asking the global community to commit to reducing the impact of invasive species and we invite everyone to support the Action on Invasives programme in any way they can.

CABI is an international intergovernmental organisation, and we gratefully acknowledge the core financial support from our member countries (and lead agencies) including:

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Australian Government Australian Centre for International Agricultural Research

Agriculture and Agri-Food Canada

Ministry of Foreign Affairs of the Netherlands

Schweizerische Eidgenossenschaft Confédération suisse Confederazione Svizzera Confederaziun svizra

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