European Commission

Investing in European success

EU-Africa cooperation in science, technology and innovation

Research and Innovation

EUROPEAN COMMISSION

Directorate-General for Research and Innovation
Directorate A - Policy Development and Coordination
Unit A.1 - Internal and External Communication

Directorate C – International Cooperation
Unit C.3 - European Neighbourhood Policy, Africa and the Gulf

E-mail: RTD-PUBLICATIONS@ec.europa.eu

European Commission
B-1049 Brussels

EUROPEAN COMMISSION

Investing in European success

EU-Africa cooperation in science, technology and innovation

2015

Directorate-General for Research and Innovation

EUROPE DIRECT is a service to help you find answers to your questions about the European Union

Freephone number (*):
00 800 6 7 8 9 10 11

(*) The information given is free, as are most calls (though some operators, phone boxes or hotels may charge you).

LEGAL NOTICE:

Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use which might be made of the following information.

More information on the European Union is available on the internet (http://europa.eu).

Luxembourg: Publications Office of the European Union, 2015.

Print	ISBN 978-92-79-45362-5	doi:10.2777/1148	KI-01-15-049-EN-C
PDF	ISBN 978-92-79-45365-6	doi:10.2777/36957	KI-01-15-049-EN-N

© European Union, 2015.
Reproduction is authorised provided the source is acknowledged.

Printed on recycled paper that has been awarded the eco-label for graphic paper (www.ecolabel.eu)

FOREWORD

If you want to go quickly, go alone.

If you want to go far, go together.

African proverb

Think of Africa and surely you will think of breathtaking natural landscapes, astounding biodiversity and of rich cultural and linguistic heritage. But Africa has also long been brimming with scientific and technological promise. This publication highlights some of many fascinating projects through which the EU and Africa are currently innovating side by side. Each one, an opportunity to learn from one another: paving the way for deeper, mutually beneficial cooperation in the future.

The research set out in this booklet is revealing what we can learn from traditional African medicines, how we can collaborate to tap into gamma ray astronomy, how we can harness the desert sun to produce clean energy and even how we can bring Africa's culinary diversity to European markets.

Most poignant, is the life-saving work of the European & Developing Countries Clinical Trials Partnership: funding research for the prevention and treatment of HIV/AIDS, tuberculosis, malaria and neglected infectious diseases in sub-Saharan Africa with the aim of accelerating the development of new or improved drugs, vaccines, microbicides and diagnostics.

By opening Horizon 2020 to the world, we've made the European Union the catalyst through which our international partners can work together with us to find workable solutions to the 21st century's most urgent problems. Whether generating renewable energy or improving crop yield, research cooperation enables us to conduct the groundbreaking science that no one country or continent can achieve alone.

Over the next five years, I have made it my priority to see science diplomacy embedded in EU relations with our international partners. I am therefore delighted by how this publication underscores the fact that EU cooperation with Africa in science, technology and innovation is already yielding so many promising results and, most importantly, for both continents

Carlos Moedas,
Commissioner for Research, Innovation and Science.

Investing in European success

EU-Africa **cooperation** in science, technology and innovation

MEDSEA

Researchers sound alarm on acidification of seas

Scientists have long suspected that the acidification of our seas may harm their flora and fauna. But the likely impact in the Mediterranean was a mystery – until now. The knowledge on acidification gained by EU-funded researchers is of great concern – the team is now calling for urgent action to protect the Mediterranean Sea's precious biodiversity and its many other benefits.

Our oceans are very efficient at absorbing carbon dioxide (CO_2) from the atmosphere. This helps curb global warming, but is not such good news for oceans. They have absorbed so much CO_2 that it is changing their chemistry and resulting in acidification.

The causes of acidification are well known, but the consequences much less so, explains Patrizia Ziveri of the ICTA, UAB, in Spain and coordinator of the MedSeA project. In fact, when the project began in 2011, the team was "starting from zero" for the Mediterranean, she says.

So the MedSeA consortium – bringing together teams from many of the countries bordering the Mediterranean Sea – began by collecting samples and conducting laboratory experiments. The focus was on endemic, iconic and economically important species, and on understanding how acidification and warming are altering marine life.

In some areas, acidification occurs naturally as CO_2 is released from underwater volcanic vents. Studies in these 'natural laboratories' showed how drastic the changes to biodiversity may be.

Iconic ecosystems at risk

The combined effect of warming and acidification will rapidly and irreversibly change marine ecosystems and endanger some of the Mediterranean's natural treasures. It will also impact livelihoods: around 147 000 tonnes of bivalve molluscs (such as mussels, clams and oysters) were produced in 2012, representing around €298 000 million and numerous jobs.

These shellfish are very sensitive to both water temperature changes and acidification, so the sector is at risk.

Reefs and sea grass meadows help protect some of the Mediterranean's idyllic sandy beaches from erosion. Also vulnerable, their absence would expose shores to the destructive power of storms.

Participants

Spain *(Coordinator), Egypt, France, Germany, Greece, Israel, Italy, Morocco, Sweden, Tunisia, Turkey, United Kingdom*

http://medsea-project.eu/				*Environment*		
FP7	*Proj. N°*	*265103*	*Total costs*	*€ 4.8 Mio*	*EU contribution*	*€ 3.5 Mio*

And if iconic species that draw people to the Mediterranean for diving disappear because of acidification, tourism may suffer. Red coral, for example, only found in the Mediterranean, grows extremely slowly and is particularly vulnerable.

The disappearance of gorgonians – or sea fans – a big draw for divers, would mean a welfare loss equivalent in monetary terms to around €5 million/year for Spain's Medes Islands. An increase in stinging jellyfish thanks to warmer waters and other human activity would compound the problem, reducing beach trips to popular Israeli tourist sites by up to 10.5% and leading to annual losses of €6.2 million.

"It's time to act"

"We are living in a rapidly changing environment and it's changing because of our actions. What people are used to seeing is in danger. It's time to act and find solutions together," says Ziveri.

The MedSeA scientists have been taking this message to everyone from politicians to the general public, with leaflets, videos and educational resources. These efforts have paid off, with the project already attracting the European Parliament's attention.

Student exchanges between Africa and Europe will also ensure a new and international generation of scientists passionate about preserving the Mediterranean.

Telling people about the problem is half of the challenge – getting them to act is the other. Acidification is irreversible, but it is possible to stop it worsening. Reducing CO_2 emissions is important, but removing other stress factors, such as over-fishing and pollutants, would improve species resilience, at least until there is an international climate agreement on greenhouse gas emissions.

Key to the success of MedSeA was intense collaboration between the project partners from various disciplines and countries. "National waters are, after all, a relative concept for acidification and climate change," says Ziveri. "It is very important to find common ground for research and policies."

What next? "It would be bad to stop our research now," says Ziveri. "We must explore possible adaptation and mitigation strategies at local, national and international levels." The team is looking into maintaining the network and the Mediterranean monitoring stations for ocean acidification set up during MedSeA.

CLARA

A planner for safer water supplies and sanitation in Africa

A large number of small communities and towns in Africa suffer from a lack of access to clean water and adequate sanitation – a major health risk. To help, an EU-funded project has developed a planning tool they can use to decide on the most appropriate solutions.

The project, CLARA, developed the tool by assessing the variety of low-cost, technically simple and decentralised technologies available to small communities in Africa.

The researchers then developed strategies for adapting these to local conditions. This flexibility is especially important for places where supplies are under pressure due to population increase or the effects of climate change.

The tool allows planners and consultants to compare the best systems available to their communities, based on inputs such as population size, budget and geographical conditions. It also estimates long-term operational and maintenance costs so communities can compare the full investment needed for each system. And it suggests ways to recover resources from wastewater and human waste for re-use – such as for agricultural production.

"This simplified planning tool provides the missing link in the technical part of the overall planning process and helps users decide based on the up-front investment needed and the lifetime costs," says project coordinator Günter Langergraber of Austria's University of Natural Resources and Life Sciences (BOKU).

The planner is designed for use by communities of up to several 100 000 people who are not linked into a centralised water and sanitation network. The tool is currently available for free online in the form of spreadsheets specific to communities in Burkina Faso, Ethiopia, Kenya, Morocco and South Africa.

By the end of the project in February 2014, the partners had trained about 100 planners in the five target countries on how to use the spreadsheet. Now, the former partners are working to transform the spreadsheet into stand-alone software, making it easier and simpler to use.

Think local

One of CLARA's strengths was its mix of partners from Europe and Africa, says Langergraber. Local partners helped in field research in local communities, providing input

Participants

Austria *(Coordinator),*
Burkina Faso, Ethiopia, Germany, Kenya, Morocco, South Africa, Spain, Tunisia

http://clara.boku.ac.at				*Environment*		
FP7	*Proj. Nº*	*265676*	*Total costs*	*€ 2 Mio*	*EU contribution*	*€ 2.5 Mio*

on their most important needs. For example, in Ethiopia's Arba Minch, population 97 000, the project involved the town municipality, the Compost Production Youth Association, the Solid Waste Collectors Association, the Arba Minch Health Office and the local university as partners.

Training was also provided to local entrepreneurs on sustainable business planning and on more efficient ways to collect solid waste.

The tool was also tested in other pilot communities in Burkina Faso, Ethiopia, Kenya, Morocco and South Africa, incorporating economic, cultural and social aspects specific to each. The researchers helped the communities carry out a preliminary planning for integrated water supply and sanitation systems, and helped the communities prepare applications to donors for funding to implement the plans.

"It was important to take into account the opinions of local partners and to be willing to adapt the project agenda several times," says Langergraber of the process. "You have to let local partners guide which way to go and be able to support them to let it happen. This is the way to create local ownership of the process."

NIDIAG

A guide to spotting forgotten diseases

With cures increasingly available for infectious diseases that hit the world's poorest regions, doctors need low-cost diagnostic tests to use these new treatments. An EU-funded project helps identify these diseases from early symptoms, saving lives and cutting healthcare costs.

Fatal or disfiguring diseases spread by pests – such as sleeping sickness or leishmaniasis – are often still widespread in very poor regions. Under-researched and under-treated, these diseases persist because of limited regional health services and low interest from drug companies.

Cheap, effective cures are becoming more common. But with the early symptoms of the diseases often vague, strong side-effects from treatments and restricted budgets, doctors need to be sure they target drugs to those who need them.

The EU-funded NIDIAG project is drafting guidelines that could take the guesswork out of diagnosing these neglected infectious diseases (NIDs). Its approach combines evidence from symptoms with on-the spot, pin-prick blood tests, replacing expensive, invasive testing in distant hospitals.

Tine Verdonck manages the contribution of project coordinator Institute of Tropical Medicine Antwerp. She says: "Our method helps doctors reach a more accurate diagnosis more quickly. The right treatments exist – they just don't get to the right people."

To illustrate the need for accurate diagnosis, Verdonck describes a Congolese study where 350 people had symptoms suggesting sleeping sickness. In fact, tests showed that only 10 of them had the disease. They needed urgent treatment, but so did almost 15% of the other patients – for other serious diseases.

According to the World Health Organisation, NIDs cost developing countries billions of dollars a year in unnecessary tests, misdiagnosis and labour lost from delayed treatment. The project provides specific guidance for NID policies in each participating country.

Diagnostic guidelines are close to the test phase for patients with nervous system symptoms – such as pain, numbness or muscle weakness – while guidelines for fever and digestive symptoms are in the pipeline. Project partner Coris BioConcept, a Belgian SME, has also developed a rapid diagnostic test that

Participants

***Belgium** (Coordinator), Congo, France, India, Indonesia, Mali, Nepal, Sudan, Switzerland, United Kingdom, United States*

www.nidiag.org				*Health*		
FP7	*Proj. N°*	*260260*	*Total costs*	*€ 6.5 Mio*	*EU contribution*	*€ 5 Mio*

completes the diagnosis for sleeping sickness, says Verdonck.

A patient-centred approach

Verdonck explains the reasoning behind the project's approach: "New patients don't claim to have a specific disease, they present with complaints and symptoms. These might be linked to an NID or something else, so our guidelines work from the symptoms up to identify their cause."

Using on-the-ground studies and medical literature, the team looked for the most common causes of nervous symptoms, fever and digestive problems. Armed with this analysis, they drew up guidelines to eliminating causes for these symptoms until a correct diagnosis is near.

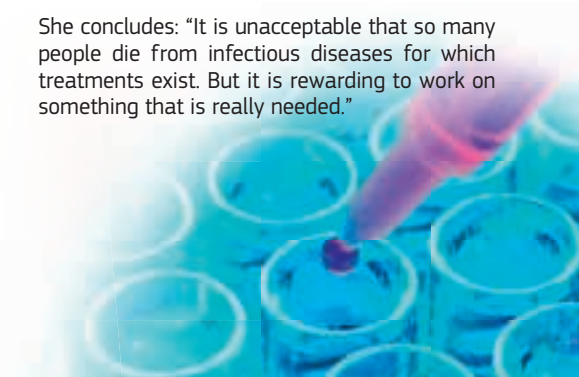
If doctors then suspect an infectious disease, they can perform a rapid diagnostic test (RDT) in their clinic to confirm or rule out many of these diseases. Taking just half an hour, and only one drop of blood, an RDT is a simple, cost-effective test for antibodies or antigens linked to an infection.

Other investigations can supplement the RDT-based approach while tests are being developed for more NIDs, says Verdonck. She predicts that work to develop the project's sleeping sickness RDT, along with patient samples from the project, could help develop other new tests.

Local trials will help the team refine the guidelines and evaluate the savings and sustainability of their approach, says Verdonck. Currently available on paper, the guidelines can be transferred to an electronic format such as a phone app if demand and local infrastructure make this viable.

"The team learned how to combine information from social sciences, clinical science, economics and basic biomedical science to create something useful and respond to a concrete need in the field," says Verdonck.

She concludes: "It is unacceptable that so many people die from infectious diseases for which treatments exist. But it is rewarding to work on something that is really needed."



EDCTP

Delivering life-saving solutions for sub-Saharan Africa

EDCTP represents a flagship program for conducting sound multi-country clinical trials in sub-Saharan Africa, building a true partnership between Europe and Africa, and fostering African leadership in scientific research. The EDCTP program has also contributed to improving linkages between African researchers and research organisations, which resulted in the launch of four African Regional Networks of Excellence for clinical trials.

EDCTP improved the ethics and regulatory environment by strengthening ethics review capacity and national regulatory authorities in many African countries. EDCTP was the main funder of the African initiative to establish the Pan African Clinical Trials Registry (www.pactr.org), which is now an official WHO Primary Clinical Trials Registry.

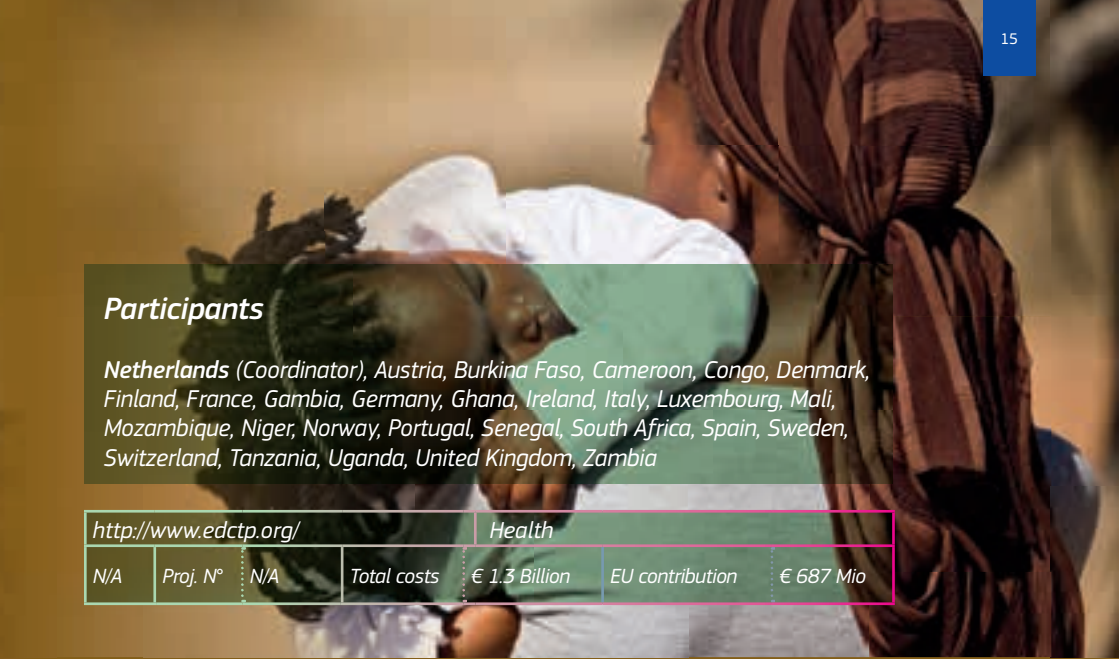
The programme has been hugely successful. Under EDCTP1 (2003-2012), a total of 254 projects were financially supported by EDCTP promoting African-European and notably trans-African research partnerships. The projects included 100 clinical trials: 30 on HIV/AIDS, 27 on tuberculosis (TB), 9 on HIV/TB co-infection and 34 on malaria. While 73 clinical trials are still on-going, positive results have been achieved.

A study of highly active antiretroviral therapy during pregnancy and breastfeeding, for example, demonstrated a 43 per cent reduction in HIV infections in infants and more than 50 per cent reduction of mother-to-child transmission during breastfeeding.

A malaria trial (4ABC) was conducted at 12 centres in seven sub-Saharan African countries (Burkina Faso, Gabon, Mozambique, Nigeria, Rwanda, Uganda and Zambia). More than 10,000 children between 6 and 59 months old were screened, and a total of 4116 children were included in the study and treated. Three novel artemisinin-based combination drugs were found to be safe and effective in treating children with a certain type of malaria.

A project examining severe malaria in children has also been successful, demonstrating that three doses of intravenous artesunate (a drug to treat malaria) over two days is as effective as five doses over three days. This finding has the potential to lower costs and reduce the risk of complications or incomplete treatment. A follow-up clinical study aims to further optimise the administration of the drug.

EDCTP1 has also provided 514 career and training awards to African scientists, including 56 career development and senior fellowships. Almost all senior fellows continued working in



Participants

Netherlands *(Coordinator), Austria, Burkina Faso, Cameroon, Congo, Denmark, Finland, France, Gambia, Germany, Ghana, Ireland, Italy, Luxembourg, Mali, Mozambique, Niger, Norway, Portugal, Senegal, South Africa, Spain, Sweden, Switzerland, Tanzania, Uganda, United Kingdom, Zambia*

http://www.edctp.org/				*Health*		
N/A	*Proj. N°*	*N/A*	*Total costs*	*€ 1.3 Billion*	*EU contribution*	*€ 687 Mio*

their respective countries after the expiration of the grant. More than 1300 research collaborators in Africa and almost 800 in Europe have cooperated so far in EDCTP-funded activities.

Building on the success of the first phase the scope of the EDCTP2 programme may be expanded. This would allow EDCTP to also support clinical trials on other poverty-related diseases – such as neglected infectious diseases like sleeping sickness – at any stage of clinical development, including costly marketing authorisation trials for new vaccines or drugs, and to foster optimised delivery of better health solutions for the specific population groups in need.

In order to prepare for EDCTP2, the Commission has a dedicated FP7 Support action known as EDCTP-Plus. Its activities are laying the foundation for implementing and managing the EDCTP2 programme in view of the proposed expansion and increased budget.

The EDCTP was created in 2003 as a European response to the global health crisis caused by the three main poverty-related diseases of HIV/AIDS, tuberculosis and malaria. Notwithstanding progress made, these three diseases accounted for over 3.5 million deaths in 2012, with the greatest burden of disease in sub-Saharan Africa, where besides ravaging lives, they impede development and cause poverty.

The EDCTP Association currently unites 11 African countries and 13 European countries as full members. Its governance involves representatives of these European and African countries. Mali, Burkina Faso, Sweden and Switzerland are about to join the EDCTP Association as well. The programme is co-funded mainly by these European and African member countries and the European Union while some co-funding is also provided by third parties, such as the Bill & Melinda Gates Foundation, the Calouste Gulbenkian Foundation and pharmaceutical industries.

PAERIP

Sharing infrastructure for better science: Africa and the EU

Research infrastructures provide the tools scientists need to understand the world and, in some cases, make it a better place. But these resources – from telescopes to biobanks, and from museum archives to wave energy test sites – cost more than most countries can afford. The EU-funded PAERIP project has started the ball rolling for new partnerships to share resources between Europe and Africa.

Partnerships that allow researchers from one country or region to access research infrastructures in another make sense:

- some phenomena are only found in certain places – plants species or weather conditions, for example;
- access encourages researcher mobility and the diffusion of knowledge;
- some of the problems these resources address are global in nature – climate change, infectious diseases, threats to water supply, for example – and require international solutions;
- pooling resources cuts costs.

Europe has a history of cooperating with the US, and to some extent Asia, says Daan du Toit, Deputy Director-General for international cooperation and resources at South Africa's Department of Science and Technology. He contributed to the PAERIP project.

But a lack of awareness of the opportunities, combined with only limited investment and complex visa requirements, have meant little attention to European-African research infrastructure partnerships. Until now.

"PAERIP has played an important role in making research infrastructures an important theme in the African-EU research dialogue, which had never been the case before," says du Toit. The project also led to the very first discussions within the African Union on sharing research infrastructures.

Putting infrastructure on the agenda

PAERIP created the first-ever inventory of research infrastructures in Europe and Africa. In Africa, these include botanical gardens, telescopes, sites for clinical trials and a drought monitoring centre. The project also organised a series of events so that stakeholders could discuss the practicalities of partnerships, what is needed and how to get there.

The team also looked into best practice – how African researchers are making use of facilities such as the proton synchrotron at CERN in Geneva.

Participants

South Africa *(Coordinator), Belgium, Egypt, France, Greece, Kenya, United Kingdom*

www.paerip.org/				*Infrastructures*		
FP7	*Proj. N°*	*262493*	*Total costs*	*€ 0.6 Mio*	*EU contribution*	*€ 0.45 Mio*

And the project explored how Africa and the EU could build new infrastructure together. "Research infrastructures are usually very expensive. It will be very difficult for Africa to build large-scale expensive facilities on its own, especially where are user communities are still small, but we could do so in partnership," says du Toit.

Discussions led to a series of high-level recommendations, now taken up within the EU-Africa high level policy dialogue on science, technology and innovation – the body set up to build understanding, strengthen cooperation and encourage joint programmes.

Recommendations include facilitating cooperation between different research infrastructure programmes, encouraging synergy between funding, and agreeing a roadmap for Africa-EU partnerships.

More than a research opportunity

In some African countries, PAERIP also led to an examination of national policies on research, infrastructures and international cooperation – the topics had not previously been considered in parallel, and the project increased understanding of the need for appropriate policies and strategies.

Those involved in this discussion will likely be interested in the socio-economic value of investment in research infrastructure. One of PAERIP's case studies illustrates the benefits covered the South African Large Telescope (SALT).

SALT is the largest optical telescope in the southern hemisphere. It is expected to be a huge contributor to the study of the early universe, quasars, galaxy populations and more.

Construction, funded through a multinational foundation, created jobs and was the catalyst for new infrastructure such as roads. Inauguration created opportunities for developing scientific and engineering skills in previously disadvantaged communities, and among scientists and technicians. Meanwhile outreach is inspiring young South Africans and SALT is now part of the school curriculum. SALT also gave a boost to tourism, leading to the creation of new small businesses.

CTA-PP

A giant leap for gamma ray astronomy

The ability to observe very high energy gamma radiation has opened a new window on the universe, and researchers around the world are keen to seize the new opportunities it offers. As part of an EU-funded project, they have created an international alliance to move beyond current experimental instruments towards a major telescope array for this new type of observation.

The CTA-PP project has paved the way for the construction of a vast telescope array for observations in the gamma ray waveband. It has shortlisted possible sites, worked out the details of the planned array's construction and eventual operation, and set up a coordination structure to take this international endeavour forward.

The project has also advanced the state of the art in gamma ray observation technology, producing prototypes of the innovative telescopes that will compose the array. The new observatory will be 10 times more sensitive and far more precise than current gamma ray instruments, says project coordinator Werner Hofmann of the Max Planck Institute for Nuclear Physics in Heidelberg, Germany.

Only the highest-energy cosmic gamma rays can be observed from Earth. The telescopes used to do so don't actually detect the rays themselves; they reveal a signature the rays produce when they are absorbed by our planet's atmosphere. This signature is a detectable form of secondary radiation — a blue glow that was discovered in another context by the physicist Pavel Cherenkov.

Cosmology beyond hot bodies

"Basically cosmic gamma rays leave tracks in the atmosphere. We take pictures of these tracks and follow them back to the sky," says Hofmann. Doing so enables astronomers to study phenomena that aren't picked up by detectors designed for other wavebands, such as visible light or X-rays.

This opportunity is particularly intriguing because, unlike other types of radiation in space, the high-energy gamma rays detectable from Earth are not emitted by hot celestial objects such as stars. "Nothing in the universe is hot enough to radiate gamma rays," Hofmann notes.

Instead, he explains, they are produced by non-thermal processes. "There a various objects in space that send shockwaves into

Participants

Germany *(Coordinator), Argentina, Austria, Finland, France, Italy, Japan, Namibia, Poland, South Africa, Spain, Sweden, Switzerland, United Kingdom*

https://portal.cta-observatory.org			*Infrastructures*			
FP7	*Proj. N°*	*262053*	*Total costs*	*€ 8 Mio*	*EU contribution*	*€ 5.2 Mio*

the cosmos. This happens during a supernova, for example, a stellar explosion. In these shock waves, particles can be accelerated to very high energies. These particles influence the fate of the cosmos; they influence matter, for example."

There is still a lot to learn about these cosmic particle accelerators. "We know they are there, but we want to understand how they work and how they impact the evolution of the cosmos. Over the past two decades, we have come to realise that the non-thermal phenomena in the universe are more important than we previously thought," says Hofmann.

The observation technologies needed to study them only emerged 20 years ago or so. "The instruments we have now are experimental," says Hofmann. The CTA-PP (Cherenkov Telescope Array — Preparatory Phase) project, he notes, has laid the groundwork for the first large-scale gamma ray observatory.

A stellar alliance

The CTA will operate across two sites, one in each hemisphere, combining more than 100 telescopes. It will permit observations of unprecedented precision and sensitivity.
Scientists and organisations around the world are collaborating in view of its construction. "We have a huge and growing consortium supporting the project. Currently, it involves 29 countries, 178 institutes and well over a thousand scientists," says Hofmann.

The CTA-PP project ended in August 2014. It has mapped out the construction, management and operation of the array and produced prototypes of the innovative technology on which the array will rely.

It has also identified potential locations. For the operations in the northern hemisphere, candidate sites have been selected in Mexico, Spain and the USA, whereas the activities in the southern hemisphere are likely to be based in Chile or Namibia.

The next milestones include finalising site selection and formalising partnerships for the construction phase, says Hofmann. The array is due to start full-scale operations in 2020.

QBOL

Barcodes to stop bugs at borders

Plants are increasingly traded across borders. But they don't travel alone – tiny pests can travel with them, some of these are damaging for local crops and other plants. An EU-funded project has made it easier for plant protection agencies to identify pests, stop them spreading and support safer trade.

Although not all pose a risk, mites, insects, fungi, bacteria and viruses can all harm plants, causing losses to farmers, reducing food production and damaging native flora. Over 300 organisms are banned or restricted from being brought into the EU because of their danger to plants.

National plant protection laboratories work hard to keep them out, using time-consuming diagnostic tests carried out by specialist scientists on suspect samples. But harmful species are difficult to spot, and safe species can look like them, so labs risk letting in pests or rejecting imports that are in fact safe.

The QBOL project developed a faster, more reliable testing system that makes screening easier. The system uses DNA barcodes – sequences of letters that describe distinctive parts of a species' genetic code – for identification. The tool combines DNA testing guidance and a free online database to identify pests.

"The database – Q-bank – is very important to support trade in plants and regulate potentially harmful organisms," says project coordinator Peter Bonants of Wageningen University & Research centre in the Netherlands.

He explains: "It protects exporters as well as importers. African exporters can guarantee their plants are safe, so they don't pay shipping costs for products ultimately turned back at foreign ports."

Because the QBOL process is faster than sequencing the whole organism – one day instead of one week – it uses expensive genetic sequencing machines more efficiently, says Bonants. This frees up resources in low-income countries and makes it easier for them to test imports to protect their own farmers and natural resources.

An investment in trade

DNA barcodes have been developed for six groups of EU quarantine species: fungi, arthropods (such as the natal fruit fly, which attacks orchard crops), bacteria, nematodes (or roundworms; for example, the citrus spreading decline nematode, which attacks citrus trees), viruses and phytoplasms.

Participants

Netherlands *(Coordinator), Brazil, China, Czech Republic, Denmark, France, Italy, New Zealand, Peru, Slovenia, South Africa, Spain, Switzerland, United Kingdom*

www.qbol.org/en/qbol.htm				*Knowledge-based Bioeconomy*		
FP7	*Proj. N°*	*226482*	*Total costs*	*€ 4.1 Mio*	*EU contribution*	*€ 3 Mio*

Parts of the gene sequence that contain DNA unique to each species were then identified, based on samples from recognised national or academic collections. Different DNA extraction and sequencing processes were tested for each group, to find the most reliable, user-friendly process for each type of organism.

Using these procedures, the team generated the database's barcodes for quarantine and lookalike species. The DNA database, along with sequencing procedures, news and other scientific information, are publicly available on the Q-bank website.

To check whether an organism should be quarantined, users generate a DNA barcode following the Q-bank procedure. They then copy and paste this sequence into the database interface to see if it matches a quarantine list species. If it doesn't, the user can give the green light for import.

To help users make the most of the database, the 20-partner worldwide project held seven training courses on how to us it, two in South Africa and Kenya. With most attendees from national plant protection organisations, courses included practical work on DNA extraction and sequencing to build regional scientific capacity.

Between Q-bank's launch in June 2010 and the end of QBOL in September 2012, the database website had over 10 000 visitors, well over its initial target of 2 000 per year. Visitor numbers continue to grow, says Bonants.

Although QBOL is now over, the Q-bank database and the collections used to build it need constant updates to ensure their quality, and the team welcomes new pest specimens or DNA.
The Dutch government is currently maintaining the database. However, the team is applying for further EU funding.

EAU4FOOD

Achieving a sustainable future for African farming

Sustainable rural development can only be accomplished by empowering local people to participate in the development of new techniques themselves. In understanding the importance of irrigation for smallholder farmers, the EU-funded EAU4FOOD project has integrated locals within the innovation process.

"The uptake of research results is lacking in many parts of the world," explains project coordinator Jochen Froebrich from Wageningen University and Research Centre, the Netherlands. "This is in particular severe when you consider that innovation in irrigation could improve agricultural productivity and might ensure a brighter future for farmers."

This is why the EAU4FOOD project has involved all relevant stakeholders in the design, test and dissemination of new and effective soil and water management strategies. This, says Froebrich, will allow African farmers to increase food production while maximising soil fertility, and at the same time minimise pollution of fresh water reserves.

Making a difference on the ground

Since it began in July 2011, EAU4FOOD has focused on the needs of smallholder farmers. Study sites were purposely selected to represent Southern Africa (Mozambique and South-Africa), Northern Africa (Tunisia), West Africa (Mali) and East Africa (Ethiopia), to provide a baseline of usable data. From this, EAU4FOOD has been able to develop guidelines for achieving irrigated agriculture under a variety of water scarcity conditions.

"In South Africa, researchers have expounded different strategies to increase the yields for tomatoes at two cooperative farms, and have gradually introduced improved practices every season," explains Froebrich. "Further works have been done to understand the regional limitations in water availability. But most importantly, tomatoes from the experiments have already been sold, and new ways to improve market access established."

In Ethiopia, several innovations have been tested to tackle crop pests and improve soil fertility. For example, the project has evaluated the response of onion and garlic to nitrogen, phosphorus and zinc additions from manure, with farmers providing feedback. Here the success of the project triggered additional governmental support to tackle the maintenance of irrigation infrastructure. In Mozambique, management strategies to

Participants

Netherlands *(Coordinator), Ethiopia, France, Mali, Mozambique, South Africa, Spain, Sri Lanka, Tunisia, United Kingdom, Zambia*

www.eau4food.info/				*Knowledge-based Bioeconomy*		
FP7	*Proj. N°*	*265471*	*Total costs*	*€ 4.9 Mio*	*EU contribution*	*€ 4 Mio*

address issues of salinity, resilience to flood damage and the use of compost for soil fertility management have been investigated.

At the Mali site, where rice is the most important crop, the challenge has been to mitigate declining soil fertility and increase access to markets. Farmers have reorganised the maintenance of irrigation canals and improved water management practices. In Tunisia, the project has focused on the issue of soil degradation in cereal production as well as on adapted crop rotations.

The benefits of inclusion

Through addressing these local concerns, EAU4FOOD – scheduled for completion in June 2015 – aims to help solve some of the enormous challenges African agriculture faces. Innovation and inclusion have been central to the project's approach, and EAU4FOOD has proposed what is called the 'Green Wheel Approach' to involve all stakeholders, including farmers, water managers, retailers, policy makers and NGOs.

"We have gained experience of how inclusion can make the difference," says Froebrich. "We have developed innovations together with local farming communities, and involved them in a process to come up with new practices and new ideas. The next step must be to involve different stakeholder communities in participatory regional planning, and to define priorities for developing land and water resources."

EAU4Food is expected to have a significant positive impact on agricultural production at farm level for many years to come, and on wider policy processes at national and trans-national levels.

AFTER

An entrée to Europe for African food

Akpan, bissap, jujube fruit and monkey bread are part of Africa's rich food heritage, but are relatively unknown to European palates. Thanks to the EU-funded AFTER project these exciting flavours, and others, could soon be available here, boosting the competitiveness of small food manufacturers on both continents.

In collaboration with partners in Benin, Cameroon, Egypt, Madagascar, Senegal, Ghana and South Africa, the AFTER project developed ways to improve some 10 foods and drinks from Africa, based on local knowledge in these countries.

The project designed ways to improve their safety, sensory quality and nutritional content by adapting traditional processing techniques. The researchers also surveyed consumers to assess their potential acceptance in Europe.

Now, European and African food manufacturers are taking a good look at these foods and drinks. Some, such as smoked catfish and hibiscus extract, are already on their way to market.

"Local collaboration and exchange of knowledge are an essential part of AFTER," says project coordinator Dominique Pallet of France's CIRAD. "The project has shown that improving the way African traditional foods are processed benefits both African and European food manufacturers."

Kong potential

One of these foods, a type of smoked catfish from Senegal known locally as 'kong', is expected on European markets later this year. Project partner Racines, a small food manufacturer based in France, is currently building a plant in Dakar that will use AFTER's processing techniques.

Senegal's manufacturers are also using the research to improve their products for local markets and for export to Europe – with help from project partners Association Afrique Agro Export and Cheikh Anta Diop University.

Hibiscus power

Pallet is also excited about the potential for roselle, a species of hibiscus native to West African countries. The flower's dried sepals are known in Senegal as 'bissap' and are used for drinks and other products.

"Hibiscus has great economic potential on the European market," he says. "It has a nice colour

Participants

***France** (Coordinator), Benin, Cameroon, Egypt, Ghana, Italy, Madagascar, Portugal, Senegal, South Africa, United Kingdom*

www.after-fp7.eu				*Knowledge-based Bioeconomy*		
FP7	*Proj. N°*	*245025*	*Total costs*	*€ 3.9 Mio*	*EU contribution*	*€ 2.9 Mio*

and flavour. We expect companies to introduce some products on the market soon."

Along with kong and hibiscus, the project adapted processing techniques for:

- **akpan** – a yoghurt-like product prepared in Benin from partially fermented, cooked maize gruel;
- **kenkey** – Ghanaian fermented wholemeal maize wrapped in maize husks or plantain leaves;
- **gowé** – in Benin, sorghum, millet or maize is gelatinised, malted, fermented and cooked to a paste, then used for a drink diluted with water and with added ice, sugar and sometimes milk;
- **kishk sa'eedi** – this sun-dried food is made in Egypt by combining wheat with fermented buttermilk in the form of yoghurt or sour milk;
- **lanhouin** (cassava fish) – salted, dried fish spontaneously fermented and used as a condiment in Benin, Togo, and Ghana;
- **kitoza** – salted and dried meat that is also known as 'biltong' in southern Africa;
- **monkey bread** – the fruit of the baobab tree is widely consumed in various forms across Africa;
- **jujube tree fruit** – the fruit is used fresh, or dried in foods, particularly in Cameroon.

The project has distributed brochures across Africa on the new, safer processing techniques for the 10 foods and drinks, and manufacturers across the continent have been contacting the project partners for additional advice.

"These products are representative of possible future partnerships in research to share traditional know-how and academic knowledge," says Pallet. "We expect collaborations for other African foods and drinks."

BRAGMA

African network for eye on Earth

Earth monitoring – observing land, security and climate change from space – can help countries protect resources and improve lives. But the technology is no use without human capacity. So that capacity-building in Africa targets the continent's priorities, an EU-funded project brought together African and European specialists to build networks and make key investment decisions.

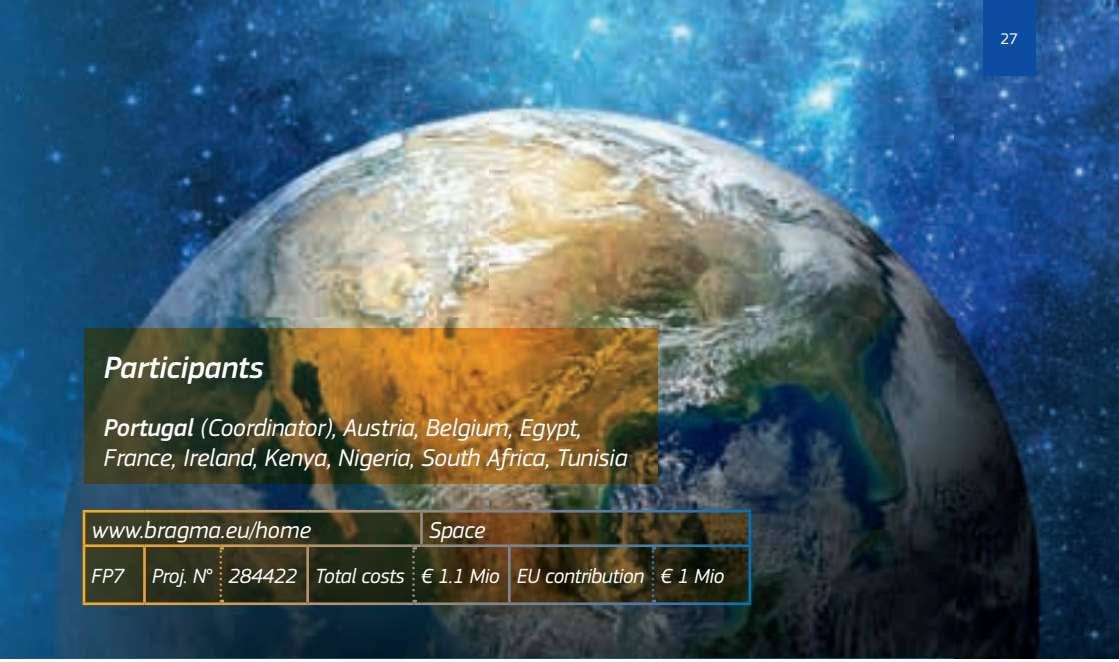
The EU and the African Union have been co-operating on earth monitoring since 2007 as part of the EU's Global Monitoring for Environment and Security (GMES) programme – now called Copernicus. Combining satellites with Earth-based sensors, earth monitoring technology helps countries manage large areas by viewing them from space.

Through the GMES and Africa initiative, the EU shares data and tools with African partners to build a single earth monitoring framework for the continent. Like every good collaboration, it needs a network to share information and a system for choosing priorities – designing both of these was the role of the BRAGMA project.

Project coordinator Ana Morgado of Portugal's Tropical Research Institute says: "BRAGMA was set up to support good communication for a GMES and Africa Action Plan (GAAP) and contribute to a more open process for choosing policies."

Started in 2012, the EU-funded project built on earlier EU-Africa collaborations in satellite technology for weather, resource, environmental and security monitoring. With partners from five African and five European states, the two-year project enabled African input and leadership of the GMES and Africa partnership.

By mapping existing GMES and Africa projects, BRAGMA gave decision-makers an overview of duplications and gaps in EU-Africa cooperation, to set sustainable priorities for future investment. It created a network of African experts and established an Africa-led research-planning system based on outcomes



Participants

Portugal *(Coordinator), Austria, Belgium, Egypt, France, Ireland, Kenya, Nigeria, South Africa, Tunisia*

www.bragma.eu/home				*Space*		
FP7	*Proj. N°*	*284422*	*Total costs*	*€ 1.1 Mio*	*EU contribution*	*€ 1 Mio*

from workshops and online discussion groups involving those researching, using and deciding earth monitoring policy.

"The focus was on African priorities," says Morgado, "and Africa had the last word in choosing these."

Decision-making dialogue

Key to the action plan was the choice of themes and issues. GAAP identified nine priority themes for future joint projects (marine and coastal areas, water management, natural resources, climate change, natural disasters, food security, infrastructure conflicts and political crises, and health) and five issues that were common to these themes (policies and institutions, infrastructure, capacity building, finance, and monitoring and evaluation).

At the request of African and European stakeholders, BRAGMA supported GAAP in the setting up of workshops on three themes chosen by African experts: marine and coastal areas (Kenya, 2012), water management (Nigeria, 2013), and natural resources (Egypt, 2013).

BRAGMA's publicity for the workshops and logistical support for experts resulted in good attendance by key stakeholders – identified with help from the African Union Commission, international organisations and academic experts – says Morgado. Over two-day meetings, sub-groups agreed on priorities for using earth observation technology.

Longer term, the workshops kick-started an online network for GMES in Africa. For each of the three themes, the project created online discussion platforms with listings for projects, links and events. These platforms were linked to each other, providing an overview of the wider GMES and Africa initiative.

The BRAGMA workshop and networking process is now mature, says Morgado. The priorities established in the workshops are being implemented – supported by the Pan – African Programme (2014-2020) – while African stakeholders have ranked the remaining six topics by priority for future work.

Although no EU funding is earmarked for a BRAGMA 2, the African Union Commission is planning further workshops and requesting expertise from EU and African states to continue what the project has started.

She says: "The EU's financial support made a great difference. Now we have to find out how to sustain the networking and communication."

EUROSUNMED

Desert sun partnership powers ahead

If there's one thing North Africa has in abundance, it is sun – and with it, the potential for cheap, plentiful solar power. An EU-funded project is adapting solar technology to the region's environment and infrastructure, while building local research capacity in the field.

Solar energy could increase energy independence for southern Mediterranean countries – if the technology is adapted to local conditions. Equipment needs to resist hot, dry climates and harsh, sandy winds and to cope with limited, dated grid infrastructure.

The EU-funded EUROSUNMED project is working with researchers from Egypt and Morocco to adjust solar technology to North African conditions. To boost long-term green energy prospects for both sides of the Mediterranean, the project is sharing European know-how with its North African partners for stronger solar collaboration.

Research will focus on three areas: photovoltaics (panels that convert sunlight into electricity), concentrated solar power (mirrors or lenses that direct sunlight to a collector to drive generators), and energy storage systems and support for electric grids.

Project coordinator Abdelilah Slaoui of France's National Centre for Scientific Research and the University of Strasbourg says: "we chose our Egyptian and Moroccan partners for their research skills and capacity, driven by growing demand for reliable domestic and industrial power."

To share know-how, student and researcher exchanges are training North Africans in chemistry, physics and materials science. "The exchanges have been beneficial for all parties, building knowledge in generating solar power in the North African climate," says Slaoui.

He predicts that generating more solar power could support economic growth in North Africa, while reducing its dependence on expensive imports of oil and gas. At the moment, Morocco and Egypt use hydroelectric plants for most of their renewable energy, which are erratic in the countries' dry climate.

Technical teamwork

Work is already underway on adapting solar panels and energy storage systems to North African conditions.

Participants

France *(Coordinator), Belgium, Egypt, Italy, Morocco, Norway, Spain*

http://www.eurosunmed.eu/				Energy		
FP7	Proj. N°	608593	Total costs	€ 6.3 Mio	EU contribution	€ 5.3 Mio

Solar panels that work in deserts could benefit people in both off-grid and grid-connected areas, while energy storage could allow a more even power flow into old, fragile grids – even when there is no sunshine – giving the reliability needed for modern lifestyles.

To protect panels from the elements, the project is developing materials for strong coatings that resist the large sand particles and fierce, hot winds of North African conditions. Various energy storage solutions have been considered, with the main system studied based on traditional heat storage using stones.

Demonstrations of these technologies are expected in June or July 2016, says Slaoui, with feedback from testers being part of the overall research process.

Other research will investigate new types of photovoltaic cells and solar power plants, and will review how much renewable energy Egyptian and Moroccan grids can support, helping national grid managers decide whether to upgrade.

The second part of the project will plan how partners can continue their research to the stage where it can be used in industry, with patents applications already submitted for some new ideas. “Countries will choose which ideas to prioritise after the project, taking into account their climate and energy needs”, says Slaoui.

Many of the research results will be shared through summer schools, workshops and conferences, and partners intend to continue their collaboration after the project, he says.

To promote further research collaboration between the EU and Mediterranean and North African countries, the project will publish a roadmap. And to encourage more education and training, the team would like to set up a European-Mediterranean master’s degree in renewable energies and an international laboratory agreement. Both will strengthen links between North African and European researchers, making it easier to develop future technology together.

OPENAIR

Take-off in sight for quieter aircraft

Noise from aircraft raises stress to unhealthy levels and reduces quality of life for those living and working near airports. An EU-funded project has developed promising technologies that together could cut aircraft noise by 2.3 decibels – building on industry's efforts to provide relief for those living near airports.

The technologies developed by the OPENAIR project aim to help the aviation industry meet its target of reducing the perceived noise from aircraft by 50%, or 10 decibels, over the two decades to 2020 (and 65% by 2050).

OPENAIR, built on the work of a number of other EU-funded projects. These include SILENCE(R), which validated technologies that, together with flight procedures, could reduce aircraft noise by five decibels.

OPENAIR took up the challenge by testing 15 possible noise reducing technologies. These included next-generation engine housing designs, adjustments to an aircraft's airframe, and new noise absorbing materials. A new landing gear design arranged components into a configuration that reduced noise. The researchers also used complex computer models of how air flows and how aerodynamic forces interact with surfaces to create noise.

The team carried out large-scale testing to assess their efficacy, using fan rigs, noise testing facilities and wind tunnels. These evaluations showed that the combined benefits of these technologies could reduce noise by 2.3 decibels.

This work sets the stage for further research and development that will take these technologies to new tests at full-scale sizes. These will determine technical feasibility and economic viability, says project coordinator Eugène Kors of France-based SAFRAN-Snecma.

"The demand for air transport, both from private consumers and from businesses, is steadily growing," he adds." The inexorable move towards more and more flights means the need to find ways of making aeroplanes significantly quieter is an urgent one."

Integrated solutions

OPENAIR, which ended in September 2014, involved 47 partners worldwide, teaming universities and research centres in Europe and Africa with major players in the aeronautics

Participants

France *(Coordinator), Belgium, Egypt, Finland, Germany, Greece, Italy, Netherlands, Poland, Romania, Russia, Spain, Sweden, Switzerland, United Kingdom*

http://www.xnoise.eu/home					*Transport*	
FP7	*Proj. N°*	*234313*	*Total costs*	*€ 30.1 Mio*	*EU contribution*	*€ 18.3 Mio*

field such Airbus, Dassault, Rolls Royce and SAFRAN-Snecma.

This collaboration helped the researchers take a holistic approach. Rather than looking, for example, at the noise generated by engine fan blades or the wingtips on their own, OPENAIR took into account the interaction among the different parts of the aircraft. This allowed them to achieve integrated, lightweight solutions.

During the project, researchers at Egypt-based Ain Shams University worked with KTH Royal Institute of Technology in Stockholm, Sweden to develop a special paint that could measure this noise throughout the aircraft under test conditions.

The aim was to allow researchers to measure noise in places where ordinary sensors could not be placed. The paint acts as a sensor, or 'microphone' to pick up sound, says project researcher Tamer Elnady of Ain Shams' faculty of engineering.

Elnady says he knew of the university's expertise in the field as he is a KTH graduate. Ain has also worked with KTH on several educational and research projects over the past decade.

"We used the expertise of their technicians and professors to help us with the electric circuit of the signals of our sensors," he says. "This technology can be used as a sensor for sound and vibration in places where it is environmentally harsh to place a sensor."

The team developed a polymer-based composite material enriched with nano-structured carbon-black in liquid form. It can be spread on any surface with the thickness required to be sensitive to acoustic pressure waves.

They applied various electrical and acoustic tests to different compositions of the paint to reach a satisfactory performance over the targeted frequency range.

The samples demonstrated a satisfactory response in picking up sound vibrations. However, the sensor's sensitivity was below expectations and still needs to be improved, adds Elnady.

With the end of OPENAIR, the two universities plan to continue working together to further develop the sensor paint for commercial testing.

ALFA-BIRD

Bio-fuelling air travel

Carbon dioxide emissions and decreasing global reserves of fossil fuels are two of the biggest challenges that must be addressed in the 21st century. Developing fuels that do not rely on petroleum and discovering other alternative fuels is one way to help decrease the carbon emissions that impact climate change, reduce the growing cost of fuel, and provide more ecologically and economically sustainable air travel.

Alfa-Bird (Alternative Fuels and Biofuels for Aircraft Development), a European Union funded research project, tested existing biofuels and new alternative fuels as a means of ensuring the long-term viability of the international air transportation industry**.**

"We are looking at a potential fuel that is produced from common yeast," said project coordinator Olivier Salvi. "This is quite innovative."

Large-scale production of biofuels requires considerable amounts of plants and biofuel from stocks such as corn has pushed up food prices. Developing fuels from a living organism, for example yeast, could be a significant step towards sustainable, renewable sources of energy that do not compete with the food chain. Its ease of genetic manipulation and cultivation could make yeast the next oil provider for biofuel production.

The specific conditions of flying, such as the cold high in the sky, together with the fact that aircrafts typically remain in use for decades, mean that finding suitable and economically viable alternatives to traditional fuels for air planes is not as easy as it may seem. Alfa-Bird researchers worked to produce a fuel involving a specific type of yeast, and they have been able to synthesise innovative molecules that could be used as renewable biofuel.

Germany-based EU-VRi – European Virtual Institute for Integrated Management oversaw the project's coordination. The company was also responsible for the economic analysis of the use of different types of alternative fuels being developed and tested by the Alfa-Bird team. The results of the project included comparisons of test fuels with fuels currently being used, as well as corrosion tests and economic assessments.

In the first part of the project, researchers looked at the viability of the new fuel products. Reducing CO_2 emissions is a major element of the EU's 2020 Strategy, so they also took into

Participants

***Germany** (Coordinator), Austria, Belgium, Canada, France, Germany, Italy, South Africa, United Kingdom*

http://www.alfa-bird.eu-vri.eu/				*Transport*		
FP7	*Proj. N°*	*213266*	*Total costs*	*€ 9.7 Mio*	*EU contribution*	*€ 6.8 Mio*

consideration the EU's priorities to use more renewable fuels as well as the goals of the EU's emissions trading scheme.

Because of the global character of the aviation industry, the sector would greatly benefit if Alfa-Bird researchers were able to develop a process to produce fuel anywhere in the world. Additionally, the local production of fuel would enhance the security of energy supplies and reduce the cost and environmental impact related to transporting fuel, Salvi added.
Further, producing fuels in the EU would create jobs and save fuel transportation costs.

Several major airlines have expressed an interest in the project's end result. Many of these companies are paying attention to their emissions, Salvi said. And the cost of fuel is becoming even a larger portion of their operating costs. It is therefore important for airline companies to know in the future which fuels will replace those currently being used.

Alfa-Bird's research will continue after the end of the project. "We are not looking at what will be in the tank of the aircraft in the next 10 years, but rather in the next 20 years," Salvi said.

INCOMMET

How to study the sea

The phenomena that affect the Mediterranean Sea have implications for the entire region, and they tie in with developments shaping marine environments around the world. But they are not yet fully understood. Tunisia's main research institute for oceanography has taken steps to boost its potential contribution to international collaborations generating new knowledge.

The Incommet project, led by Tunisia's National Institute of Marine Sciences and Technologies (INSTM), enabled the institute to pursue its strategic development and foster research excellence throughout its team with the support of French and Italian partners. It helped INSTM researchers to acquire new know-how, harmonise methodology with its partners and greatly improve its visibility, reports project coordinator Malika Bel Hassen.

A common concern

Why was greater harmonisation needed? "We share the same sea," Bel Hassen explains, "and we need to have teams that can collaborate in an equal way in conducting research on this sea."

The objective, she says, was to build capacity to deliver outstanding science and support the dialogue about global environmental challenges and sustained development in the southern Mediterranean region. "Phenomena such as climate change and biodiversity loss affect both the southern and the northern Mediterranean," she adds. "Research teams that address these issues should work together."

Incommet thus focused on the transfer of skills, mainly through study visits, workshops and training. It also enabled the INSTM to test various types of equipment loaned by its project partners, the University of Aix-Marseille in France and the Zoological Station of Naples in Italy. "Before deciding on investments, we were able to try out this equipment and see how it performs in our marine environment," says Bel Hassen.

The project also tapped into expertise and research opportunities that Tunisia is particularly well positioned to provide — such as creating new knowledge about the enrichment of the marine environment by Saharan dust blown in from the desert. This enrichment increases the growth of phytoplankton, Bel Hassen explains, but it is unclear which dust-borne nutrients provide this boost, and by which mechanisms.

Participants

Tunisia *(Coordinator), France, Italy*

www.incommet.org				*International Cooperation*		
FP7	*Proj. N°*	*295009*	*Total costs*	*€ 0.91 Mio*	*EU contribution*	*€ 0.5 Mio*

Valuable information can be gained in the Gulf of Gabès. "Saharan dust goes well beyond our Tunisian waters," says Bel Hassen. "A number of European teams concentrate on this topic and have shown that it affects living resources in the northern Mediterranean Sea. So the idea is to use the Gulf of Gabès as a pilot site to study the phytoplankton response. It is strongly impacted by the phenomenon because it borders on the Sahara."

Fresh insights could help to shed new light on a significant problem. "Some phenomena here in Tunisia, such as red tides, are closely linked to Saharan dust and desert storms," Bel Hassen explains. "These red waters are caused by algal blooms, which can occur very quickly in the presence of excess nutrients. They have implications for key regional socioeconomic activities, such as fishing and tourism."

Heading for international waters

Bel Hassen reports that Incommet was instrumental in raising the INSTM's profile abroad. "It paved the way for our team to be connected to other researchers, to be visible and to contribute to further projects," she notes.

New contacts were notably established with research organisations in Germany, Italy and Spain, and existing collaborations with partners in France gained momentum. Incommet notably contributed to the identification of research priorities regarding water and marine pollution in the Mediterranean region, in the wider context of the Mediterranean Innovation and Research Coordination Action (MIRA) project.

INCOMMET ended in December 2014, leaving a promising legacy. Greater awareness of the INSTM's abilities has already translated into two new projects with EU partners. One of these focuses on sustainable tourism; the other aims to set up an observing system for various physical and biological parameters. Bel Hassen looks forward to further international collaborations plumbing the depths of the Mediterranean Sea.

MENFRI

Sustainable forestry: creating jobs, benefiting rural communities, advancing gender equality

To stop the Mediterranean region turning into a desert, the EU-funded MENFRI project is establishing forest management strategies and solutions that address environmental concerns across the Mediterranean and create jobs.These include forest management training, support for women's associations in North Africa to commercialise forest-based products, certification of sustainably sourced goods in the Mediterranean and promotion of rural tourism.

At present, many rare and endangered species found in Mediterranean forests are threatened with extinction because of climate change.

This could have catastrophic consequences for local communities reliant on forest-based products.

"In Maghreb countries, the overexploitation of forest resources, together with predicted temperature increases and precipitation decreases, will increase the risk of desertification," explains Enrique Doblas Miranda, scientific coordinator of the Centre de Recerca Ecològica i Aplicacions Forestals (CREAF), Spain.

"This overexploitation is resulting in the loss of valuable raw materials and resources for dependent populations. If innovative smart strategies can be applied, then these forests could still be managed for use, but in a renewable way."

Creating jobs while combating climate change: a sustainable future

The project has shown that sustainable and economically beneficial forestry is possible. In Europe, where land abandonment is a key issue, responsible forest tourism is being encouraged as a way to bring economic benefits to local communities while promoting forest conservation.

"Studies also support the use of alternative – and highly profitable – forest resources such as mushrooms, cork and aromatics. Also, forest owners' associations play a key role by favouring forest product certification," says Doblas.

In Africa, MENFRI is encouraging local women's associations to start marketing non-wood products including pine nuts, argan oil (used in the cosmetics industry) and carob tree fruit. "The potential benefits are huge, ranging from increased income to general community development in terms

Participants

Spain *(Coordinator), Belgium, Italy, Morocco, Tunisia*

www.menfri.eu/				*International Cooperation*		
FP7	*Proj. N°*	*609542*	*Total costs*	*€ 0.83 Mio*	*EU contribution*	*€ 0.75 Mio*

of education, health, gender equality and wellbeing," adds Doblas.

MENFRI is currently in negotiations with the Programme for the Endorsement of Forest Certification (PEFC), the world's largest forest certification system, to encourage the certification of more forest-based products at a regional and global level.

Making the world of difference

Doblas believes there are two key issues that set the MENFRI project apart. "First, environmental research projects often forget about the applicability of their results," he says. "We can publish hundreds of papers on tackling global change, but no one will read them if forest owners have no money to put these methods into practice. This is why MENFRI aims to make all research available, while addressing the causes of untapped potential in the Mediterranean."

Second, MENFRI is an innovation project closely related to rural and local development, and is fully engaged with issues such as poverty and gender equality. "International organisations, such as the FAO and the Union for Mediterranean, have shown an interest in a number of MENFRI initiatives," he adds.

The activities put forward by MENFRI, which is due for completion in November 2016, represent the first step in overcoming underdevelopment in the Mediterranean forestry sector, promoting job opportunities by unleashing innovative solutions. "These natural resources should be fundamental to helping local communities escape financial dependency (for example, being reliant on just one unsustainable crop) and start moving towards sustainable development," concludes Doblas.

ERAFRICA

Rethinking the blueprint for African-EU research

African and EU countries have long worked together on science and technology research. Now the way they collaborate is being rethought for the modern world. An EU-funded project has used a different approach for a more equal, coordinated research partnership between Africa and the EU.

Traditional EU-Africa joint research is based on a 'donor-recipient' model, with the EU and individual Member States separately deciding how to develop science in Africa, then African institutions applying for funding to implement these ideas.

But this model did not always maximise EU and African countries' priorities cohesively and in a coordinated fashion and sometimes did not built upon previous research. It also became outdated as African research capacity expanded – along with the local budgets to finance it.

In 2009, African and European countries launched the ERAfrica project to develop a more balanced, coordinated way of collaborating on scientific problems.

Project coordinator Jean Albergel of France's Institute of Research for Development says: "Research institutions from Africa and the EU defined how to work together in an equal partnership. It was also the first time there was equal funding from Africa."

While European scientists have the chance to learn from Africa-driven research, African countries gain from a more efficient relationship with Europe, building their own innovation and technology expertise. A stronger research capacity supports African economies, reducing poverty and boosting growth.

The ERAfrica partnership, funded by from the European Commission's Seventh Framework Programme for Research and fits within the overall policy framework of the Joint Africa-EU Strategy, which has supported African science since 2007.

Participants

France *(Coordinator), Austria, Belgium, Egypt, Finland, Germany, Kenya, Portugal, South Africa, Spain, Switzerland, Turkey*

www.erafrica.eu				*International Cooperation*		
FP7	*Proj. N°*	*266603*	*Total costs*	*€ 2.3 Mio*	*EU contribution*	*€ 2 Mio*

Consensus-based

To identify areas for joint research and ways of funding it, the project first surveyed existing relationships between African and European research institutions. This showed partners where there were research overlaps and gaps and indicated potential project funding structures.

Partners agreed on three project themes: renewable energy, research crossing two fields (such as studying indigenous fungi to develop antibiotics) and new ideas from researchers. EU-Africa joint projects, partnerships to develop new ideas, and investment in African research institutions' capacity were settled on as funding mechanisms.

Albergel explains the themes selected: "It was a partnership so we needed to negotiate. For example, renewable energy resulted from combined African and EU priorities." The team then disseminated information about the project through a dedicated website and publications to attract project ideas from African, European and international programmes and organisations.

After two years of preparation, the first call was launched to trial priorities, approaches and organisational systems developed using the project's collaborative ethos. The response was strong: 124 projects applied for funds.

A final list of 17 projects was chosen to share €8.29 million of funding. Food security was a clear priority in the list, while health and new energy were also popular topics.

The selected projects mainly chose the collaborative research model but almost half of the projects will contribute to capacity building, while almost a quarter are innovation partnerships. All projects have at least two African partners and two European partners.

To be continued

Some of the ERAfrica partners are applying for further EU funds to finance the administrative costs linked to a second call in late 2015/early 2016. Angola and Mali have already promised experts to help prepare this call, while the South African and French project members will continue to support the ERAfrica approach financially beyond this call.

Albergel concludes: "The way of collaborating with Africa was changed by this project. No one partner is more important than the others – this was a collaborative project where all parties worked together on an equal footing."

CAAST-NET PLUS

Building bridges for Africa-EU scientific cooperation

Researchers, politicians and policy-makers from Europe and Africa are addressing major social, economic and environmental challenges through EU-funded projects that aim to foster long-term collaboration in science, technology and innovation.

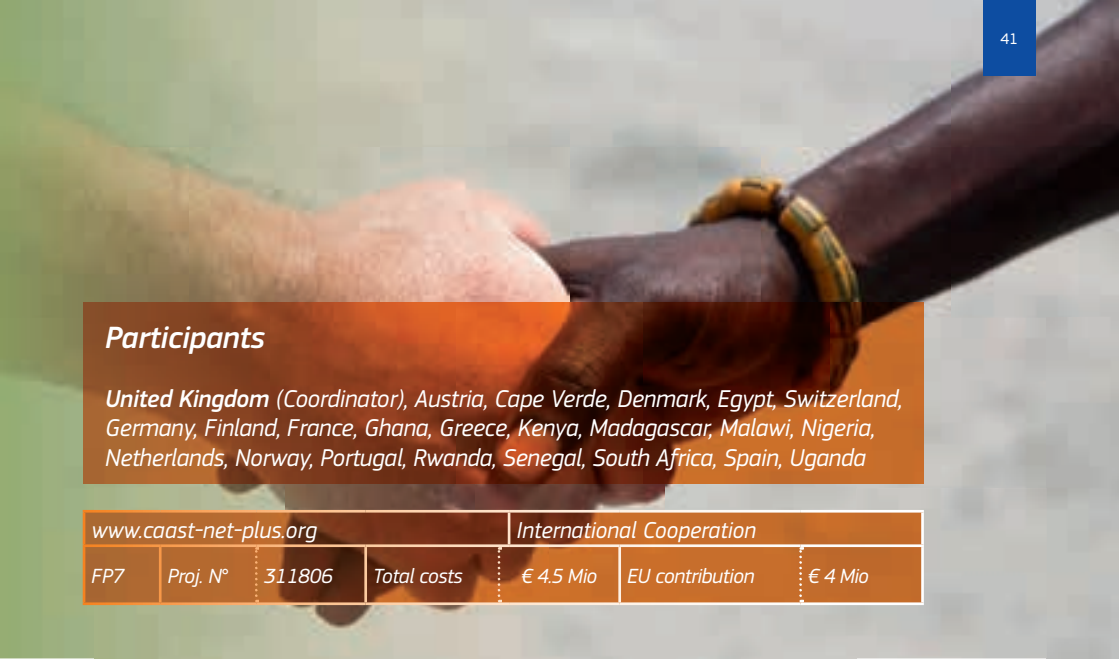
The initiative CAAST-Net Plus and its predecessor CAAST-Net are cultivating new ideas, sharing knowledge and building working relationships to tackle major challenges affecting both Africa and Europe, from climate change to health and food security. In the process, they are building an unprecedented environment for the development of science and technology cooperation.

"Collaboration has advanced tremendously in recent years, and these projects have been an important contributing factor to that," explains Andy Cherry, the CAAST-Net Plus coordinator at the Association of Commonwealth Universities in the United Kingdom.

While CAAST-Net, launched in 2008, enhanced the development of long-term EU-Africa collaboration in science and technology, CAAST-Net Plus, launched in 2012, focuses specifically on fostering bi-regional research in the critical areas of food and nutrition security, climate change and health. The project's 26 participants include national authorities and agencies in Africa and Europe with a role in policy-making.

"We are addressing key challenges for both continents," Cherry says. "For Africa, there is inevitably a focus on development, for example, using science and innovation to improve agriculture and food security for African populations and creating better healthcare systems. But these issues are no less important to Europe in light of social, demographic and economic challenges. There may be different perspectives and priorities but the benefits are mutual."

Through thematic working groups, meetings and forums, CAAST-Net Plus is building bridges for collaboration between the two continents, focused not on short-term results but on long-term change that will help generate scientific and technological innovations to improve citizens' lives on both sides of the Mediterranean. The large number of African governments involved in the project will help ensure new ideas and shared knowledge feed directly into future policy across the continent, while Europe stands to benefit from Africa's resulting economic, social and technological development.



Participants

***United Kingdom** (Coordinator), Austria, Cape Verde, Denmark, Egypt, Switzerland, Germany, Finland, France, Ghana, Greece, Kenya, Madagascar, Malawi, Nigeria, Netherlands, Norway, Portugal, Rwanda, Senegal, South Africa, Spain, Uganda*

www.caast-net-plus.org				*International Cooperation*		
FP7	*Proj. N°*	*311806*	*Total costs*	*€ 4.5 Mio*	*EU contribution*	*€ 4 Mio*

For that to happen, the project is addressing historical constraints to collaboration, from funding issues to political barriers.

"Consider project funding for example," Cherry says. "On the one hand, it is hard to generate long-term impact from short-term projects that are expected to generate results in just a few years, and there is also the issue of ownership among stakeholders."

He explains that because most funding for research and technology projects in Africa comes from Europe, African researchers find it hard to establish a sense of ownership for their work – an issue that could be addressed through new funding instruments in Africa or a joint Africa-EU funding platform.

As Eric Mwangi, CAAST-Net Plus Africa Region Coordinator at the Ministry of Education, Science and Technology in Kenya, points out: "African partners in Africa-EU partnerships need to be willing to fund programmes in health, climate change and food and nutrition security, and not only rely on research funding from other regions."

Providing recommendations, fostering awareness and enriching policy-making to address these and other challenges will be among the key achievements of CAAST-Net Plus.

CODEMISUSED

When codeine becomes an addiction

How extensive is codeine misuse and dependence? Although not yet substantiated, anecdotal evidence suggests the problem is common, making it a concern for public health and pharmacy practice. EU-funded researchers are collecting evidence to feed into guidelines for pharmacies and doctors.

Codeine represents an interesting quandary. Its effects vary from one individual to the next; when self-medicating, patients have very different estimates of what is safe; the potential for misuse, dependence and related harm are well known; and national regulatory responses vary.

Codeine is a weak opiate, used for management of mild to moderate pain. It is often prescribed for coughs and can be bought without a prescription in many countries. What many people don't realise is that with consecutive and/or excessive use, tolerance occurs over time, and the user can experience withdrawal symptoms when the drug is stopped. This, especially when pain is present, increases the risk of habit-forming use and the potential for dependence, explains the principal investigator within the CODEMISUSED project, Marie Claire Van Hout of Ireland's Waterford Institute of Technology.

Misuse includes:

- self-medicating at higher doses or for longer than advised;
- use other than the instructions on the label or the intended use;
- recreational use for mind-altering effects;
- situations where risks and adverse consequences outweigh the benefits.

As a mild opiate, prolonged use of codeine in combination products containing paracetamol and ibuprofen can cause health problems, including neurological damage, gastric ulcers, pancreatitis and gastrointestinal bleeding.

The project is tackling the problem from every angle. A scoping review has created a knowledge base of all existing research. The team will study online purchase trends and national reports on prescribing and treatment trends, monitor drug fora, collect survey responses from customers, medical, pharmacist and addiction treatment providers, and interview individuals in treatment.

The results will feed into innovations including pharmacy-based screening and intervention initiatives and the provision of

Participants

Ireland *(Coordinator),*
South Africa, United Kingdom

http://codemisused.org				*People*		
FP7	*Proj. N°*	*611736*	*Total costs*	*€ 2 Mio*	*EU contribution*	*€ 2 Mio*

health and product information during the customer-pharmacist transaction.

Learning from South Africa

South Africa has already recognised the problems associated with codeine, and is ahead of Europe in responding. Pharmacies are now connected to a central database that registers each purchase of medicine containing codeine. Each customer must provide their ID number. Problem users cannot therefore move from one pharmacy to the next to secure a supply. A maximum of 4g can be bought each month. South Africa also has smartphone app that helps a user establish whether he or she is likely to have a codeine problem through a series of questions.

The system is only in its infancy, emphasises Van Hout, but the model could be of interest in Europe – especially as the same approach could be applied to other drugs susceptible to misuse, such as anti-histamines and laxatives.

Treating the 'respectable' addiction

The project will recommend risk management and customer monitoring systems, as well as appropriate training and protocols for community pharmacy intervention. "We want to empower pharmacies as custodians of codeine medicines," says Van Hout.

At the moment, when a pharmacist suspects a problem, he or she has nowhere to refer a customer. Those caught up in this 'respectable form of addiction' are not typical drug addicts and don't fit into standard drug programmes.

And once a problem is identified, codeine abusers don't want to queue up for methadone – an effective treatment – like a heroin addict. An alternative approach could be tapered prescriptions that gradually reduce the amount of codeine provided. This would integrate primary care and community pharmacies.

A first step is however patient awareness. "People need to know that codeine is addictive," says Van Hout.

One result of which the project team is already proud is the acceptance of CODEMISUSED as a European Network of Centres for Pharmacoepidemiology and Pharmacovigilance project on the European Medicines Agency register. This will not only give visibility to the project, but open a discussion within the pharmacovigilance sector – the results of which will feed back into the project's eventual guidelines.

DEAMMRECIRC

Cleaning up in aquaculture

Aquaculture is making a vital contribution to feeding the world's growing population. A project involving one African and several European partners has developed new water purification technologies that remove the nitrogen present in effluent from water used in fish farms. They are likely to reduce the costs and environmental impact of aquaculture waste water.

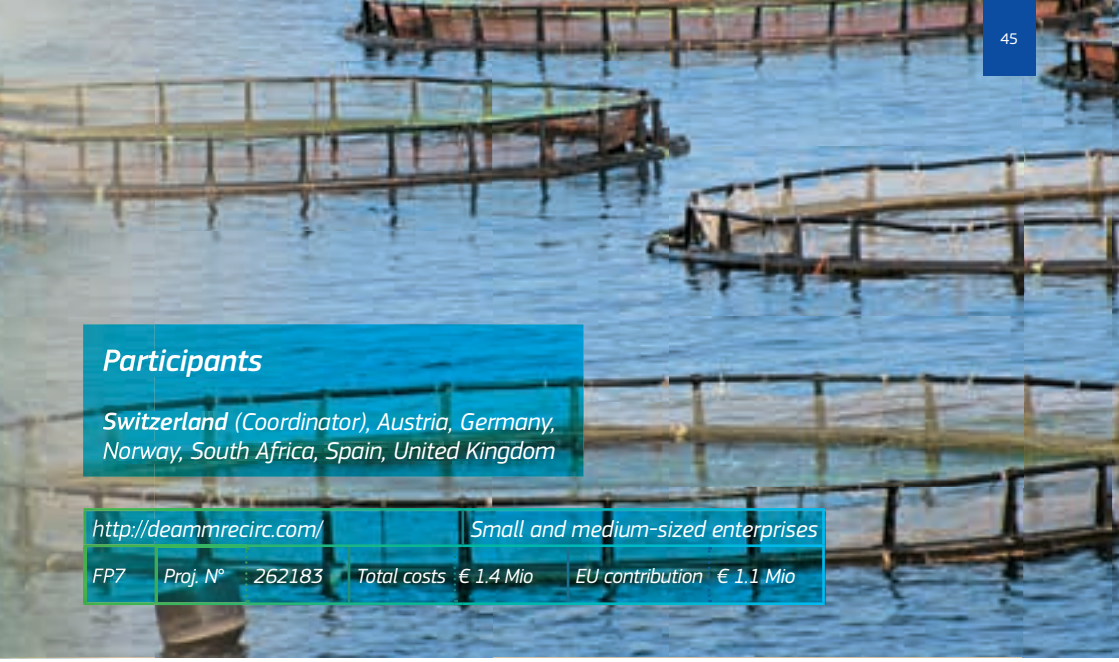
In many parts of the world, wild-fish stocks are falling or stagnating. A thriving aquaculture sector is vital to take the pressure off fishing fleets and help feed a rapidly growing world population.

In the EU-funded DeammRecirc project, African and European partners developed innovative solutions for aquaculture waste treatment that may reduce the costs of 'recirculation aquaculture systems' (RAS) that purify and reuse the water in fish farm tanks. The technology also reduces the flows of harmful chemicals such as nitrates into the environment, in particular into rivers and seas. It achieves this by converting them into harmless nitrogen gas which is released into the atmosphere.

RAS are highly desirable because they take up less space and allow much higher fish-stock densities – thus they are more productive. However, fish produce chemical and organic waste that must be removed to maintain a healthy, productive stock. Currently, this is achieved by a mixture of mechanical and biological filters.

A central part of this existing purification process is a bio-filter that converts toxic ammonia and nitrite waste-products into less-harmful nitrates. But these nitrates can build up to dangerous levels in the recirculation system, so waste water is periodically released into the environment and replaced with fresh water.

This nitrate-rich effluent can cause eutrophication (excess nutrients) in the waters where it is released, which causes algal growth, reduces oxygen concentrations and kills many native organisms. In addition, as the bio-filter consumes oxygen it can lower the pH in the recirculation water, making it more acidic. This requires the addition of expensive buffer chemicals to restore equilibrium.



Participants

Switzerland *(Coordinator), Austria, Germany, Norway, South Africa, Spain, United Kingdom*

http://deammrecirc.com/				*Small and medium-sized enterprises*		
FP7	*Proj. N°*	*262183*	*Total costs*	*€ 1.4 Mio*	*EU contribution*	*€ 1.1 Mio*

Reactor for recycling

According to the DeammRecirc team, the problem with this current practice is that it does not go far enough. In the same way that plants 'fix' nitrogen from the atmosphere such that it enters the food chain, so the end point of the fish-farming process should restore this nitrogen to the atmosphere as harmless nitrogen gas, rather than letting it accumulate in rivers, lakes and seas.

The DeammRecirc partners have adapted an existing 'deammonification' technology – used successfully in the waste water treatment industry – to the particular needs of RAS aquaculture.

A first step was to create an 'anammox' bacterial culture that could convert ammonia and nitride to nitrogen in fresh and salt-water environments. The team created a salt-water tolerant culture using the waste sludge produced by sea bass fish farming. In fact, the process used to create this culture can be used by fish farmers to produce their own 'home-grown' varieties. This culture was then used in the DeammRecirc prototype reactor.

In their reactor, waste water and sludge first undergo a nitrification pre-treatment that partly converts ammonia into nitrite. The effluent is then passed to the main anammox reactor containing the sludge. Here the nitrite and ammonia are converted into nitrogen gas through bacterial action. By the end of the project, the technology had undergone successful tests using pilot plants. In one, operating for 10 months, very high anammox activity was observed.

Partners are now working on further developing DeammRecirc's technology with the aim of creating commercial applications for the aquaculture sector. They expect that a fully developed and automated technology will reduce production costs, have a lower carbon footprint, reduce the levels of nitrates released to the environment and reduce the extraction of clean water. It is also expected to give the partners a competitive advantage in the rapidly growing global markets for farmed fish products, including the South African partner – the Marine Finfish Farmers Association of South Africa – which plans to implement the technology further.

CAPWA

Tapping into a new source of water – flue gas

What does a coal-fired power plant produce? Well, electricity, of course, but it could also supply clean water. And so could many other types of factory. Technology developed by the EU-funded CapWa project extracts water from flue gas – more, in some cases, than was initially brought in. It also saves energy. Considering how many industrial processes use water that is eventually released as vapour, this advance could help whole sectors of the economy to avoid precious resources going up in smoke.

For the average coal-fired power plant, for example, the technology can extract more water than the plant can reuse, turning it from a consumer into a producer. This is due the fact that the plant 'exhales' a substantial amount of vapour.

"There is a lot of water in flue gas," says project coordinator Ludwin Daal of DNV GL – Energy, formerly known as KEMA. "For a typical coal-fired power plant of 400 MW, there is about 150 cubic metres of water coming out per hour, and you only need about 20 % of that to make the plant self-sufficient."

Recovering water from flue gas also helps to save energy, as it dispenses with the need to heat the gas to reduce corrosion in the stack. And in some cases, the de-watered warm air can actually be reinjected into the process.
These energy savings are, in fact, one of the main reasons why the technology quickly pays for itself. A paper production plant, says Daal, could expect return on investment within a year or two.

Waste not, want not

It's an attractive prospect. If Europe's power plants and paper factories combined were to adopt this technology, for example, they could provide water for two million households per year and save energy worth the annual consumption of three million homes, according to CapWa's estimates.

Advances such as these do not materialise out of thin air. CapWa involved partners from Europe and beyond, bringing together a wide range of complementary skills towards a shared objective. Together, they upgraded and refined technology conceived several years earlier by lead partner DNV GL – Energy. This teamwork, a cornerstone of EU-funded research, is truly unique, says Daal. Other parts of the world, he notes, "don't have this approach of different ideas, different cultures all brought together and working as one". Without it, he adds, these outcomes could not have been achieved.

Participants

Netherlands *(Coordinator), Germany, Ghana, Israel, Italy, South Africa, Spain, Tunisia*

http://www.watercapture.eu				*Nanosciences, nanotechnologies, materials and new production technologies*		
FP7	*Proj. N°*	*246074*	*Total costs*	*€ 5.8 Mio*	*EU contribution*	*€ 3.6 Mio*

Vapour abhors a vacuum

The resulting application is based on innovative hollow fibre membranes with a selective outer layer. Arrays of these tubes are placed into a humid gas stream. A vacuum maintained inside the tubes enables the arrays to suck water out the gas: the difference in pressure draws the molecules composing the air stream towards the vacuum, but the membranes' selective coating will only let water molecules through.

The result is surprisingly clean water, extracted in a single step. This can be used for a variety of purposes, notably as high-purity boiler feed water.

The next stage in the deployment of this technology, says Daal, would be application in two or three large-scale demonstration sites, followed by commercialisation through a systems integrator. There is considerable interest from water-scarce areas around the world, notably in Africa, the Americas, Australia and China. But they are not the only ones who might benefit: given the potential of this elegant solution, clients in water-rich areas are also likely to take advantage of the technology.

PROGRESS

Responsible and inclusive innovation reaches the San of South Africa

Sidelined for decades because of their traditional way of life, South Africa's San, also known as Bushmen, are now attracting admiration and respect for their traditional knowledge on the medicinal properties of plants. An EU-funded project is helping the San to share this knowledge and claim their rightful benefits.

"Responsible innovation is not just about governing emerging technologies for the safety of the rich, but also about innovating for and with the poor," says Doris Schroeder, coordinator of the PROGRESS project and director of the Centre for Professional Ethics at the UK's University of Central Lancashire.

The project goal is to make the concept of responsible research and innovation – RRI – better known outside of Europe, says Schroeder. But she also has a personal ambition: to ensure the project is useful for vulnerable populations that have too often been overlooked.

The San fit this description perfectly. They are the Earth's 'oldest people' and very vulnerable to modern development. There are only 9 000 left in South Africa, with a further 80 000 across Namibia and Botswana. The San are traditionally hunters and gatherers, and today "at the bottom of the pecking order", says Roger Chennells, a lawyer working for the South African San Institute (SASI) – a partner in the PROGRESS project.

Through its involvement in PROGRESS, SASI – an NGO serving the San people – has been able to secure a significant three-year government contract for recording traditional knowledge together with the San Council.

The benefits of buchu

The funding was partly used to organise meetings bringing together all stakeholders. Representatives from the South African Department of Science and Technology attended when a government initiative to record important indigenous knowledge began.

One topic discussed at the meetings was the buchu plant, which has been used by the San as a powerful healing plant for centuries, and is now a key ingredient in commercialised well-being and medicinal products. This comes hot on the heels of the use of knowledge on another plant – sceletium – a natural mood-enhancer, to develop a product now on the shelves in South Africa and the US.

Participants

***United Kingdom** (Coordinator), Australia, China, Germany, India, Italy, South Africa, Spain, United States*

www.progressproject.eu				*Science in Society*		
FP7	*Proj. N°*	*321400*	*Total costs*	*€ 1.7 Mio*	*EU contribution*	*€ 1.5 Mio*

The "unexpected" government contract gives security to the idea of reaching similar agreements for other plants and will change the landscape for traditional knowledge-based innovation for ever, says Chennells. Moreover, the same process could be followed by indigenous groups in other countries.

Sharing the knowledge... and the benefits

Key to the concept of RRI in this case is benefit-sharing. This has been compulsory since 1992, when the Convention on Biological Diversity was agreed. However, as very few compliance mechanisms are effective, the requirement is often ignored, says Schroeder. PROGRESS is increasing visibility of the concept and showing how it can work in reality as part of responsible innovation.

For sceletium, the income, which is starting to become significant, goes to the San Council, which then shares it fairly while investing in education and training.

Europe has much to learn from other regions in terms of RRI, says Schroeder. "Many of Europe's poor would benefit from *inclusive* innovation. Brazil, China, India and South Africa are spearheading the idea, while it is sidelined in Europe," she says.

"We don't often talk about innovation and the poor in the same sentence, but there are lots of innovations that can help the poor," she adds.

One of the PROGRESS project's successes has been to raise awareness of the need for a broader definition of RRI that encompasses inclusive innovation, says Schroeder. Another has been to ensure the concept of RRI is known within policy circles in China and India.

Before the project finishes in January 2016, the team plans to continue promoting RRI, including through documentaries on the San and their knowledge, a major meeting co-hosted by the World Health Organization, and a number of academic papers already in the pipeline.

As for the San Institute, it is hoping to reach agreements for two other indigenous plants: the rooibos and the aloe.

NOPOOR

Fresh insights into ending poverty

EU-funded researchers around the world are collecting new information on poverty from 21 countries in Africa, Asia and Latin America, gaining fresh insights and making recommendations governments can apply to improve lives.

Great strides have been made in reducing poverty around the world. Still, 1.2 billion people remain in extreme poverty. Millions more live on poverty's edges, vulnerable to economic shocks. Other factors, such as globalisation and rising economic and political inequality, have also created new challenges.

Researchers from the EU-funded NOPOOR project are taking a fresh look at poverty's multi-dimensional nature in today's world, and the reasons for its persistence. They are collecting additional statistical evidence on poverty from Africa, Asia and Latin America, leading to new insights. By the end of the project in March 2017, they aim to provide recommendations governments and aid organisations can apply to improve living conditions for the extreme poor across the world.

"Poverty remains a major problem in many countries and additional research is needed to better understand its causes, the new forms it takes today and how it resists current poverty reduction policies," explains project coordinator Xavier Oudin of France's Institut de recherche pour le développement. "Our ambition is to raise the awareness of policymakers and other stakeholders of the issues that our research is documenting."

So far the researchers have:

- assessed current methods to measure poverty and developed new indicators to fill existing gaps – such as on the quality of employment, which sheds light on the number of 'working poor';

Participants

France *(Coordinator), Austria, Belgium, Brazil, Chile, Germany, Ghana, Luxembourg, Madagascar, Mexico, Peru, Senegal, South Africa, Spain, United Kingdom, Vietnam*

www.nopoor.eu					*Socio-economic Sciences and Humanities*	
FP7	*Proj. N°*	*290752*	*Total costs*	*€ 9.9 Mio*	*EU contribution*	*€ 8 Mio*

- created online databases collecting existing statistics and those developed by the project – a one-stop reference for researchers and policymakers worldwide;
- compiled information on elections to pinpoint whether they have been 'free and fair' – providing a quantitative approach to governance issues, such as the accountability of leaders, which is known to be a determinant of the efficiency of poverty reduction policies;
- studied the effects of globalisation, with preliminary results indicating that export processing zones, although creating jobs through foreign direct investments, may have adverse economic effects – the researchers have recommended that trade liberalisation should be balanced by offsetting industrial, labour and social policies;
- examined the effects of industrial strategies – for example, a study looks at how some developing countries are adapting Germany's use of vocational training programmes to create pools of specialised workers.

NOPOOR's research will feed into local case studies on topics such as education and cash transfer policies. These will guide the project's more general conclusions and policy recommendations. "At the moment we tend to think that there is not one policy that fits all," says Oudin.

Collaboration to fight poverty

NOPOOR brings together some 100 researchers from Europe and developing countries: Peru, Brazil, Chile, Mexico, Vietnam, India, Senegal, Ghana, South Africa and Madagascar. This collaboration with local researchers is essential to filling current information gaps on the factors affecting poverty levels, says Oudin.

"In several countries, it is very difficult to find figures covering a reasonable timespan, without which assessments of the evolution of people's economic conditions are not possible," he explains.

International participation will also help disseminate the project's findings and recommendations to a wide audience. For example, the project has been organising meetings between NOPOOR's researchers, local politicians and other stakeholders. The meetings resulted in valuable input on the priorities for poverty research and on how NOPOOR's results could be helpful for policymaking.

At the end of the project, several conferences and workshops will be dedicated to the dissemination of results to local policymakers. "This way the research will be disseminated directly to the people who need it," says Oudin.

CASSANDRA

Trading on trust

You'd be forgiven for thinking that the documents accompanying shipping containers are always accurate. But you would be wrong — discrepancies are frequent. EU-funded research suggests that a system of trusted trade lanes could address this problem and the associated business and security concerns.

The Cassandra project set out to reduce the uncertainty caused by unreliable information about shipped goods. Its answer to the problem involves a system of trusted trade lanes.

These secure supply corridors, which are based on cooperation and transparency throughout the entire chain, are backed by sophisticated IT platforms referred to as global data pipelines.

This approach would ensure that all the actors involved have easy access to accurate information, and it could help businesses to save vast amounts of money. "New trade facilitation measures such as these could generate several hundred billion euros worth of benefits annually worldwide," says Gerwin Zomer of TNO in the Netherlands, the project's technical coordinator.

The concept was demonstrated in three Living Labs, which respectively focused on imports from Africa, imports from Asia and exports to the US.

No more suprises

The word 'risk' means different things to different people, the Cassandra team notes. For businesses, the prospect of losing money is a key concern. Border control focuses primarily on the security aspects.

And uncertainty translates into added risk. Discrepancies make it harder for buyers to manage their stock, and they set alarm bells ringing for those in charge of keeping us safe — an understandable reaction that can, however, stall delivery while containers are checked.

Delays can have financial implications, particularly for perishable goods. Inefficiencies throughout the supply chain are thought to account for 30% of the food that is lost or wasted between harvest and consumption.

Containing the risks

It would be unfair to suggest that shipping containers are some kind of intermodal jack

Participants

Netherlands *(Coordinator), Austria, Belgium, Egypt, Germany, Luxembourg, Portugal, Spain, Switzerland, United Kingdom*

www.cassandra-project.eu				Security		
FP7	Proj. N°	261795	Total costs	€ 14.7 Mio	EU contribution	€ 10 Mio

in the box. Nonetheless, there is room for improvement, says Zomer.

"Importers often don't know what, exactly, is in a container until they open it," Zomer notes, citing the example of a British supermarket chain that receives frequent shipments from China. "In 30% of the cases," he reports, "the packing list was incorrect."

Such surprises are not just a logistical headache. "The list is the basis for the security declaration submitted to customs," Zomer notes. "And this declaration is the information on which EU customs base their risk analysis. So these analyses are frequently based on incorrect information." However, there are many business control measures that can help to reduce commercial and security risks simultaneously, allowing customs declarations to 'piggyback' on commercial data.

Total transparency

The British company, which participated in one of the Living Labs, solved its problem by hiring a tallyman to check the packing lists at source. Inaccuracies were practically eliminated and, as an added bonus, containers can now be sent directly to individual locations in the UK, rather than to a central warehouse from which goods are later dispatched.

So there are huge advantages to be gained by transparency. And data pipelines can be set up to generate further savings, notably by reducing the time required to produce the extensive paperwork linked to the container and its content.

Case studies such as these provided the inspiration for the concept of trusted trade lanes ensuring end-to-end supply chain control. This approach expands on the current system of trusted traders — also known as Authorised Economic Operators — who benefit from simplified EU customs procedures.

It's a compelling idea, says Zomer, who adds that the business case is sufficiently enticing for companies to adopt it voluntarily. It has also met with great interest among policy- and decision-makers at EU and international level.

Cassandra ended in August 2014, having delivered a proof-of-concept to demonstrate the system's feasibility. A new project — CORE — is now taking the trusted trade lane vision forward with an even wider variety of partners around the world.

eI4Africa

African e-science on the fast track

Africa's ICT infrastructures are fast evolving, creating exciting opportunities for researchers keen to join the global e-science community. Dedicated European-African initiatives are exploring the potential and engaging with stakeholders to raise awareness of the possibilities. An EU-funded project has assisted them in this task.

The eI4Africa project identified many African research networks whose work would benefit from access to more powerful ICT infrastructure, analysed their technology needs through a comprehensive state-of-the-art review. The partners also developed a number of flagship demonstrators to demonstrate the power of e-infrastructures for international collaboration, including an environmental data repository and a community health portal. These and more than 20 other applications can be accessed through the Africa Grid Science Gateway (sgw.africa-grid.org).

In addition, the project has contributed to the wider drive to advance e-science in Africa and facilitate interoperability with the European Grid Infrastructure. It has set up operational entities supporting various aspects of e-infrastructure development and issued recommendations for policy-makers and technology developers.

"eI4Africa supported e-infrastructure collaboration between Europe and Africa in many ways, but its main added value was to raise awareness and widely demonstrate the benefits of e-Infrastructures to African stakeholders," says project coordinator Karine Valin of Sigma Orionis, France.

Global connections

Researchers today use staggering amounts of data. Certainly, scientists across the ages have done outstanding work in low-tech settings, often in relative isolation. But today, advances in many areas require vast, distributed computing capabilities — such as the computing grid technology that is used to process the glut of information generated by the Large Hadron Collider.

That said, e-science technology doesn't just enable researchers to crunch more data. It also allows them to contribute to large-scale collaborative endeavours, disseminate their findings more widely, and draw on information generated by others. It is, in short, a major boost to science.

Participants

France *(Coordinator), Italy, Netherlands, Rwanda, Sweden, Tanzania, United Kingdom*

http://ei4africa.eu				*Information and Communication Technologies*		
FP7	*Proj. N°*	*312582*	*Total costs*	*€ 1 Mio*	*EU contribution*	*€ 0.9 Mio*

The necessary infrastructures don't come cheap, and investments are needed to make them more widely available. Dedicated initiatives are promoting their development in Africa, with support from various EU-funded projects.

The UbuntuNet Alliance for Research and Education Networking, a member of the eI4Africa consortium, is one prominent organisation pushing this e-infrastructure agenda, as is the West and Central African Research and Education Network. "These organisations are trying to organise and galvanise the management and technological infrastructure to make things happen," says Simon J. E. Taylor of Brunel University London, the project's technical coordinator.

eI4Africa, which ended in October 2014, assisted them in their task. It reached out to several African research networks and analysed their technology needs.

"We have found excellent communities that are working together despite technological problems. We haven't solved these for them," says Valin, "but we have built demonstrators they can use to show how their lives could change if their countries supported this kind of technology."

There are many more such networks to be found, says Taylor; the ones involved in eI4Africa are representative, reflecting the exciting partnerships such groups could establish with the global e-science community. "Bringing researchers into an international collaboration is a fantastic opportunity," he notes. "There is always that chance of a fundamental breakthrough when you bring together people working across different fields."

A glimpse of the future

The flagship demonstrators a glimpse of an exciting future. "How can African researchers convince their governments of the potential of e-infrastructures and science gateways and support future development? Ours shows what can be achieved in a short time!" Taylor explains.

To jump start collaboration and development, eI4Africa has created a 'project wall' that promotes promising international projects where e-infrastructures can make an impact.

Cover page image (from top left to bottom right): © idesign2000, #41204013; © svetlana485, #63595826, © svetlana485, #63595826, © demerzel21, #68820846; © Nmedia, #64180152, © Markus-Mainka, #75204153, © 3dmentat, #52890070; © science photo, #66285968, © Renate Wefers, #39568988; © chalabala, #50761498, © bp1100, #75530264, © Phimak, #45823931; © mrfiza, #55068103, © kaprikfoto, #73571606, © michelealfieri, #73835325, 2015. Source: Fotolia.com © NVWA - the Netherlands Food and Consumer Product Safety Authority, #Insects-Arthopods_2, 2015. Source: QBOL.

Images: Page 5: © European Commission, 2015; Page 7: © jovanmandic, #72706380; Page 8: © Tilio & Paolo, #64473132; Page 9: © hereje, #58700330; Page 10: © africa, #22259367; Page 11: © africa, #22259276; © cronopio, #33238519; Page 12: © psdesign1, #70662261; Page 13: © NLPhotos, #4045037; © Schlierner, #73475367; Page 14: © Eric Isselée, #2037680; Page 15: © poco_bw, #9666149; © Nolte Lourens, #43826530; Page 16: © Daniela Gavrilov, #2155212; Page 17: © Adele De Witte, #31897138; © Flavijus Piliponis, #55416266; Page 18: © hannesthirion, #59064878; Page 19: © danmir12, #68466052; © Tomasz Bulik; Page 20: © pauli197, #64638381; Page 21: © Renate Wefers, #28083018; © NVWA - the Netherlands Food and Consumer Product Safety Authority, #Insects-Arthopods_2, 2015. Source: QBOL; Page 22: © ALCE, #73925219; Page 23: © Cecilia Lim, #41038043; © Pascal06, #56070399; Page 24: © lzf, #62433498; Page 25: © spaxiax, #74072787; © Dominique Pallet; Page 26: © Sergey Ryzhov, #76479321; © Jürgen Fälchle, #62695581; Page 27: © Tryfonov, #51146793; Page 28: © luigi-giordano, #20323884; Page 29: © chungking, #73336462; © Vibe Images, #13923805; Page 30: © rebius, #76252576; Page 31: © Deutches Zentrum für Luft- und Raumfahrt e.V (DLR); Page 32: © dade72, #65373625; Page 33: © arsdigital, #76333951; Page 34: © Julija Sapic, #45186722; Page 35: © INCOMMET; © Eric Alberola, #30219923; Page 36: © ozphotoguy, #64249468; Page 37: © bertrand CHAVIN, #2531151; © CREAF; Page 38: © micromonkey, #61326042; © belahoche, #60037049; Page 39: © angellodeco, #53712251; Page 40: © Gajus, #53316128; Page 41: © BirgitKorber, #67213489; © Galyna-Andrushko, #60917713; Page 42: © goodmanphoto, #63552580; Page 43: © Pecold, #67188779; Page 44: © pkproject, #68893214; © teleginatania, #73944884; Page 45: © Schlierner, #71606252; Page 46: © Gratien Jonxis, #2449844; Page 47: © Ary, #1976657; © africa, #15778190; Page 48: © michaeljung, #27602071; Page 49: © Amy Azra Dean; © ulkan, #58863262; Page 50: © b201735, #59599996; © sabino.parente, #57017140; Page 51: © dr322, #73431010; Page 52: © il-fede, #54640189; Page 53: © Kzenon, #73017255; Page 54: © karelnoppe, #77930512; © eI4Africa Partnership; Page 55: © Petrovich12, #71693489; © karelnoppe, #66468085; Source: Fotolia.

HOW TO OBTAIN EU PUBLICATIONS

Free publications:

- one copy:
  via EU Bookshop (http://bookshop.europa.eu);
- more than one copy or posters/maps:
  from the European Union's representations (http://ec.europa.eu/represent_en.htm);
  from the delegations in non-EU countries (http://eeas.europa.eu/delegations/index_en.htm);
  by contacting the Europe Direct service (http://europa.eu/europedirect/index_en.htm) or
  calling 00 800 6 7 8 9 10 11 (freephone number from anywhere in the EU) (*).

  (*) The information given is free, as are most calls (though some operators, phone boxes or hotels may charge you).

Priced publications:

- via EU Bookshop (http://bookshop.europa.eu).

KI-01-15-049-EN-C

Horizon 2020 is the main financial instrument implementing the Innovation Union, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness. It aims to bridge the gap between research and the market by helping innovative enterprises develop their technological breakthroughs into viable products and services.

Building on the success of previous research framework programmes, this brochure presents a selection of results from EU funded projects that have shown great strides in innovation, which will make a positive change to our daily lives.

Project information

Publications Office

ISBN: 978-92-79-45362-5