proponents of the field say that the recent adoption of rigorous protocols that avoid or detect contamination have largely addressed such issues.

The first study to show that large-bodied animals and plants drop enough DNA into their environment – through defecation and shedding cells – to be detected[3] was published in 2003. Five years later, another team showed that DNA in pond water could be used to detect the invasive American bullfrog (*Rana catesbeiana*)[4]. Most such studies gather genetic material from aquatic environments because DNA disperses and remains free-floating in water, and can be detected in trace amounts.

Massive time savings

Around 2014, Michael Schwartz, who heads up the US Forest Service's National Genomics Center for Wildlife and Fish Conservation in Missoula, Montana, and his team used eDNA to detect the endangered and hard-to-monitor bull trout (*Salvelinus confluentus*). The researchers initially analysed 124 water samples from waterways across Montana[5], amassing a volume of data equivalent to that collected over the previous 15 years through conventional surveys that used electrofishing, a method that is risky for people and fish, in which a current is run through the water to attract and then net fish. "We were able to do that in eight days," Schwartz says. "We have estimated that it is about two to ten times faster and two to five times more cost-effective to use eDNA compared to electrofishing."

Earlier this year, Schwartz's team published results showing that DNA left in snow tracks or in snow near camera traps could be used to identify the presence of Canada lynx and wolverine (*Gulo gulo*) in Montana, and a small carnivorous mammal called the fisher (*Pekania pennanti*) in Idaho[6]. Conventional methods for detecting the presence of land animals typically involve time-consuming surveys to identify an animal by its tracks alone, or from scat.

In another case, eDNA was more sensitive than conventional methods. When a camera trap image was unable to clearly identify what looked to be a Canada lynx in an area where its presence was unknown to rangers, eDNA extracted from the snow confirmed that the creature was indeed a lynx, says Schwartz.

In some cases, eDNA analyses are being used to enforce policy. In 2014, the UK government approved the use of eDNA analysis for detecting the endangered great crested newt in land-use surveys that are required by law.

With a burgeoning market for eDNA analyses, dozens of companies now offer genetic tests for detecting rare species.

To reduce problems such as false positives that plagued the field in its early days, there are now standard methods for handling samples and detecting contamination, says Florian Leese, an aquatic ecologist at the University of Duisburg–Essen in Germany. Adequate sampling, sterile equipment and experimental controls can all help to guard against contamination. DNAqua-Net, a European-based network of researchers who work with industry bodies and regulatory agencies, is developing best-practice guidelines on how to design and validate tests for individual species and to define the amount of DNA needed to be sure a test returns a genuine positive result.

KONRAD WOTHE/NPL

DNA from snow tracks allowed scientists to detect the presence of the Canada lynx.

But some ecologists are reluctant to abandon conventional methods. Jean-Marc Roussel, an aquatic ecologist at the French National Institute for Agricultural Research in Rennes, says that more studies comparing the cost and accuracy of eDNA analysis to conventional monitoring methods are needed before environment-management decisions are made on the basis of eDNA results.

Molecular ecologist Cecilia Villacorta Rath at James Cook University in Townsville, Australia, thinks researchers also need to demonstrate that genetic tests are sensitive and specific enough to avoid false negatives – the failure to detect a target species that is there.

Robust results are essential because the discovery of an endangered species can have weighty legal ramifications. In the United States, such species need to be protected under the Endangered Species Act, so an area could be designated a critical habitat as a result.

As the chair of DNAqua-Net, Leese is leading the charge to develop standards that ensure genetic tests are accurate and give agencies confidence in their results. The next step could be to certify companies and laboratories doing eDNA studies, he says.

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ITALIAN PLAN FOR NEW RESEARCH AGENCY DRAWS CRITICISM

Scientists say they haven't been consulted on the creation of another national science funder.

By Marta Paterlini

The Italian government is debating whether to set up a national research agency – an organization that could boost research funding by hundreds of millions of euros a year. But although scientists have long called for such an agency, some are concerned about the latest plans. They worry that researchers haven't been involved in discussions about the organization, and that it won't be independent of political influence.

Prime Minister Giuseppe Conte, who leads a coalition government of the populist Five Star Movement and the centre-left Democratic Party, mentioned the idea for a National Research Agency (ANR) in a September speech. The proposal will be discussed in parliament this month as part of Italy's 2020 budget bill.

Italy already has several mechanisms for funding basic science, but researchers complain that the system is haphazard, and that calls for grant proposals are often delayed. The country's existing National Research Programme has a budget of €2.5 billion (US$2.8 billion) for 2015–20. But

"The agency's function and governance can only be decided after a discussion with the research community."

the scheme's main source of money for basic research — the Research Projects of National Relevance programme — last made a grant call in 2017. Moreover, Italy invests only 1.2% of its gross domestic product in research — far below the European Union target of 3%.

Many scientists had hoped for an agency that would simplify research funding, but note that the ANR instead adds another organization with its own budget. And it is not yet clear how the ANR would interact with Italy's other science-funding mechanisms. The bill up for discussion states that the agency would coordinate the direction of research at universities and public research bodies, fund "highly strategic" projects and encourage Italian participation in European and international research initiatives. It would receive €25 million in 2020, €200 million in 2021 and €300 million per year from 2022.

Missed opportunity

"It is promising that the matter is part of the current government's strategy. Unfortunately, the model behind it is not yet clear," says Vincenzo Costanzo, a cancer researcher at IFOM, a molecular-oncology institute in Milan. The move is a missed opportunity to bring all government research funding under a single body in a transparent and independent manner, he adds. "We really need an agency that regulates the annual grant calls."

Researchers also worry that they have not been involved in the ANR's planning, and are concerned about the agency's political independence. According to the bill, the ANR's leaders will be appointed mainly by politicians: the prime minister would choose the director, and government ministers would select most of the agency's eight-member executive committee. Many had instead hoped for an agency overseen by research managers and scientific advisers.

Overall, the agency is a positive step, says Giuseppe Remuzzi, director of the Mario Negri Institute for Pharmacological Research in Bergamo. But the government's role should be restricted to making suggestions about appointments, and executive-committee members should be chosen by a group operating under the best practices used by the international scientific community, he says.

Lorenzo Fioramonti, Italy's research minister, says that scientists should feed into the ANR's development. He was involved in the idea to create the agency, but says he was surprised that the draft law also included information on the agency's governance. "The agency's function and governance can only be decided after a discussion with the research community," he says. Fioramonti had hoped that the bill would serve only to set up the agency, with details of its governance and grant management decided early next year.

FIRST VACCINE AGAINST DEADLY EBOLA VIRUS WINS APPROVAL

The shot has already been given to hundreds of thousands of people in ongoing Africa outbreak.

PAMELA TULIZO/AFP/GETTY

An Ebola vaccine has been approved by the European Medicines Agency.

By Ewen Callaway

The world finally has an Ebola vaccine. On 11 November, European regulators approved a vaccine that has already helped to control deadly outbreaks of the virus — the first time any immunization against Ebola has passed this hurdle.

The decision by the European Medicines Agency (EMA) to allow US pharmaceutical company Merck to market its vaccine means that the product can now be stockpiled and, potentially, distributed more widely than it is now, particularly in Africa. In 2015, Gavi, the Vaccine Alliance — a global health partnership based in Geneva, Switzerland, that funds vaccine distribution in low-income countries — told manufacturers that it would commit to purchasing their Ebola vaccines once they had been approved by a "stringent health authority", such as the EMA.

Although several other vaccines against Ebola — a haemorrhagic fever that causes severe diarrhoea, vomiting and bleeding — are in development, Merck's is the only one that has been tested during an outbreak, in which it was shown to be highly effective at preventing infection.

The vaccine, first patented in 2003, has been administered on an emergency basis to quell the ongoing outbreak in the Democratic Republic of the Congo (DRC), which has killed some 2,000 people since it started last year. It was also used during a 2018 outbreak in that country, and in Guinea in 2015. In the current outbreak, hundreds of thousands of people have received the Merck shot, including more than 60,000 health-care workers in the DRC and several neighbouring countries.

"This is a vaccine with huge potential," said Seth Berkley, chief executive of Gavi, in a press release after the EMA's decision. "It has already been used to protect more than 250,000 people in the DRC and could well make major Ebola outbreaks a thing of the past." The organization has supported the stockpiling and delivery of Ebola vaccines and hopes to build up a global supply that could be rolled out quickly during future outbreaks.

Future protection

The EMA's approval "makes a big difference", says David Heymann, an epidemiologist at the London School of Hygiene and Tropical Medicine. But he stresses that research into the Merck vaccine and development of others must continue. "The message is that the research is not done," he adds. Research could help to develop vaccines that offer longer-lasting immunity, target more than one species of Ebola and are easier to store.

Merck's vaccine, which is marketed under the name Ervebo and known to researchers as rVSV-ZEBOV-GP, was tested in a clinical trial

CORRECTION

The News story ‘Italian plan for new research agency draws criticism’ (*Nature* **575**, 424–425; 2019) incorrectly described a speech by Giuseppe Conte as his first as premier.