Environment

Coastal Dead Zones

Linking Land-based Activities to Degraded Marine Ecosystems

Concept Note

THE RATIONALE

Areas where dissolved oxygen levels in seawater are substantially diminished for extended periods of time, also known as “coastal hypoxia zones”, are being reported with greater frequency, intensity and extent all over the world. Such events can have devastating consequences to fragile marine ecosystems and their diverse resources and benefits. Low-oxygen events can progress to large scale ‘dead zones’ that may trigger massive die-offs of commercially important fish and shellfish, and can also cause mortalities in seabirds and mammals exposed to highly toxic biotoxins produced in a harmful algal bloom (HAB). Coastal ‘dead zones’ are typically formed in warm coastal waters that receive an abundance of land-based sourced runoff concentrated in nutrients such as nitrogen and phosphorus.

PROPOSAL OBJECTIVE

Support Member States in evaluating terrestrial and marine drivers leading to coastal hypoxia through identifying and tracking the movement of nutrient sources from land into the marine environment using nuclear-related applications.

KEY TECHNOLOGY

- Nuclear and isotopic tracer techniques such as uranium-thorium (U-/Th-) series radionuclides, receptor binding assay (RBA) methods, and compound-specific isotope analysis will be used to identify, source, and track drivers of coastal dead zones and their subsequent impacts on marine and coastal ecosystems.

PROPOSED ACTIVITIES

- Working collaboratively with a team of experts utilizing the potential of nuclear and isotopic techniques to assess land-ocean connections to address coastal eutrophication that may trigger low oxygen events and Dead Zones through exchange of interdisciplinary expertise, field observations and laboratory experiments
- Develop and transfer novel and advanced nuclear and isotopic technologies in nutrient and seafood monitoring programmes and risk assessment, through trainings, technical workshops and targeted field missions.
- Develop and implement a field programme in riverine, coastal and marine biogeochemistry and oceanography, through collection and analysis of samples at key sites to assess the drivers of coastal hypoxia events and their evolution leading to dead zone development.

DURATION

Four years

BENEFICIARY COUNTRIES

All coastal IAEA Member States.

EXPECTED OUTCOMES

Novel nuclear-based tools and methods made available to Member States to assess processes responsible for triggering deoxygenation events in coastal and marine waters.

TOTAL ESTIMATED BUDGET

Budget (EUR) with 7% PSC included

Year 1	294 250
Year 2	272 850
Year 3	176 550
Year 4	165 850
Total	**909 500**

IAEA Nuclear Sciences and Applications

19-01193E

Food & Agriculture

IAEA Greenhouses

Addressing Development Challenges through Adapted Research

Concept Note

THE RATIONALE

IAEA Nuclear Sciences and Applications Laboratories in Seibersdorf are housing greenhouses that support research and development (R&D), as well as capacity building, in the area of plant breeding, food and environment protection, and soil and water management under the programme of food and agriculture. Through R&D, the greenhouses focus on improving crop varieties and their resilience to diseases, adaptation to extreme weather conditions, and crop quality, while at the same time helping Member States to maximize outputs from crop production systems ensuring conservation of soil and water resources. IAEA greenhouses that were built in 1989, despite the repairs, are no longer fit for purpose. Upgrade of the greenhouses to additional 600 square meters is required, in order to meet the growing demand of Member States facing new challenges caused by climate change.

PROPOSAL OBJECTIVE

Enhance the capability of IAEA to support R&D and capacity building, in the area of food and agriculture to address Member States' development challenges.

KEY TECHNOLOGY

- Crop irradiation services for the induction of mutations in plants to increase diversity, quality, yield stability and greater resilience to environmental stresses.
- Irradiation techniques, analysis and control of contaminants, and radiotracers (C-14) studies related to food-borne diseases.
- Isotopic and radiation methods to measure and monitor the interaction between soil, water and nutrients in cropping systems.

PROPOSED ACTIVITIES

Plant Breeding and Genetics Laboratory

- Modular Greenhouse: Construction of environmental control glasshouse compartments for research and training related to tropical and temperature crops.
- Climate Chamber: Construction of a roof structure to protect the climate chambers against the elements and a concrete foundation as support for growth of plants under environmental control.

Food and Environment Protection Laboratory

- Glasshouse: Construction of controlled environment glasshouse compartment for contaminant transfer and radiotracer (C-14) studies.

Soil and Water Management and Crop Nutrition Laboratory

- Greenhouse Complex with Three Compartments: Construction of climate controlled (18–28ºC) complex to study and enhance soil-water-plant synergies in the context of climate-smart agriculture (for tropical and temperate crops) and nuclear emergency response (transfer of radioactive materials from soil-water to crop).

DURATION

Two years

BENEFICIARY COUNTRIES

All IAEA Member States

EXPECTED OUTCOMES

Enhanced capacity and capability of IAEA to address the rising demand of Member States to provide assistance in R&D to respond to climate change challenges in the area of food and agriculture.

TOTAL ESTIMATED BUDGET

Budget (EUR) with 7% PSC included

Total 3 750 000

*Including planning, greenhouse construction and new climate chambers

20-01113E

Food & Agriculture

Concept Note

Food Fraud

Implementation of Nuclear Techniques for Authentication of Foods with High-Value Labelling Claims Coordinated Research Project (CRP)

THE RATIONALE

Numerous foods are sold at premium prices because of high-value labelling claims related to specific production methods, unique characteristics and origins. These claims include agricultural, geographic, ethical and nutraceutical labelling specifications that add value to the products and can offer developing countries export advantages in global markets. However, they are also the most susceptible to economically motivated adulteration and fraud. Some examples include vanilla from Madagascar, coffee from Colombia and Taliouine saffron from Morocco. Experience has demonstrated that when food fraud occurs there is an implicit – and usually unintended – food safety risk associated with product tampering often in unlicensed premises. In order to protect consumers, several nuclear, isotopic and related techniques have proven suitable for confirming a wide range of high-value labelling claims such as geographical indications, free-range, organic, wild versus farmed and natural versus synthetic.

PROPOSAL OBJECTIVE

Enable Member States to protect and promote food products with high-value labelling claims by development and application of nuclear and related techniques.

KEY TECHNOLOGY

- Stable Isotope-Ratio Mass Spectrometry (IRMS) analysis of light mass elements in bulk tissue or specific compounds and Thermal Ionization Mass Spectrometry (TIMS) of heavy mass elements.
- Multi-element analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS), Liquid scintillation counting (14C), X-ray fluorescence (XRF), neutron activation analysis and related techniques.
- Complementary techniques may also be used such as Nuclear Magnetic Resonance Spectroscopy and Mass Spectrometry for metabolomics and proteomics, rapid screening methods as well as DNA-based methods.

PROPOSED ACTIVITIES

- Research and development linking the isotopic and elemental composition of food to the climatic and geologic conditions of its production area.
- Analytical method development, adaption and validation to construct databases for authentic high-value foods.
- Selected laboratory experimental studies to demonstrate the robustness and value to stakeholders.

DURATION

Five years

BENEFICIARY COUNTRIES

All IAEA Member States

EXPECTED OUTCOMES

Increased analytical capacity of Member States in the implementation and operational use of nuclear and related techniques to authenticate foodstuffs with high-value labelling claims. The project also aims at safeguarding consumers and producers, ensure religious and ethical compliance, stimulating domestic markets and reducing barriers to international trade.

TOTAL ESTIMATED BUDGET

Budget (EUR) with 7% PSC included

Year 1	95 000
Year 2	95 000
Year 3	55 000
Year 4	90 000
Year 5	90 000
Total	**425 000**

IAEA Nuclear Sciences and Applications

20-01115E

Environment

Concept Note

Marine Plastics

Tackling the Challenge using Nuclear Applications Phase III

THE RATIONALE

The ocean is one of the largest final repositories for all man-made pollution. As a result, marine debris builds to tremendous volumes in the ocean through a combination of unsustainable activities and practices, as well as inadequate waste management on land. Floating plastic debris, including nano- and micro-sized plastic particles have received much recent attention reflecting serious public concern. Such small plastic particles are ubiquitously distributed in the ocean because they are inherently resistant to environmental degradation and are found even in the most remote compartments of the ocean. Secondary toxicity may occur from Persistent Organic Pollutants (POPs) or other contaminants that tend to be adsorbed onto microplastic particle surfaces during prolonged transport in seawater. Due to their small size and texture, microplastic particles can also be readily mistaken for planktonic organisms, making them an easy food substitute. Once ingested by marine organisms, micro plastics may trigger adverse toxicological effects on marine biota and may also eventually be transferred even to humans through the consumption of contaminated seafood. The role of microplastics as vectors of hazardous contaminants to marine biota is an issue of concern for all Member States, especially developing coastal Member States and Small Island Developing States (SIDS) that rely heavily on fisheries as a major source of food and income.

PROPOSAL OBJECTIVE

Support Member States in using nuclear and isotopic tools and techniques to better understand i) marine nano- and micro-sized plastic particles affect the health and function of commercially important marine organisms; and ii) to evaluate their role as potential vectors for contaminant transfer and bioaccumulation.

KEY TECHNOLOGY

- Develop and use new radiotracer technologies to track the movement of marine nano- and micro- sized plastics in select marine organisms.
- Incorporate new nuclear-based methods to assess plastics related organismal stress, such as nuclear magnetic resonance (NMR) spectroscopy or omics.

PROPOSED ACTIVITIES

- Using controlled aquaria, conduct experiments to assess transport of marine nano- and micro-sized plastic particles into key fishes, and other species.
- Evaluate the potential organismal impacts from nano- and micro- sized plastic particles.
- Use labeled tracers to assess incorporation and impact of key contaminants such as PCBs, PAHs, Hg, Pb etc.
- Promote efficient communication between scientists and stakeholders.

DURATION

Four years

BENEFICIARY COUNTRIES

All IAEA Member States.

EXPECTED OUTCOMES

Improved monitoring programmes in Member States of persistent organic pollutants (POPs) associated with micro plastics. In addition, reduced amount of non-degradable plastics in the oceans due to the use of bio-plastic based materials.

TOTAL ESTIMATED BUDGET

Budget (EUR) with 7% PSC included

Year 1	155 150
Year 2	133 750
Year 3	155 150
Year 4	90 950
Total	**535 000**

IAEA Nuclear Sciences and Applications

20-01120E

Environment

Concept Note

Seafood Safety

Developing Tools for Improved Monitoring and Assessment of Contaminants and Seafood Authenticity Phase III

THE RATIONALE

Seafood currently provides about 17% of the world's animal protein and about half of that is produced in aquaculture. The other half is still being harvested from the ocean. Seafood is not only a globally important food commodity, but it is also vital for international trade, with economic numbers expected to grow almost exponentially in the coming decades. However, seafood can also be a real threat to human health when it contains harmful contaminants, such as, for example, biotoxins derived during algal blooms, or a potent toxicant such as methyl-mercury. As world-wide chemical production continues to escalate, an increasing suite of contaminants must also be monitored in all commercial seafood, preferably in the country of origin, and by a reliable and unbiased method. The bioaccumulation of these contaminants in seafood and the possible compounding impacts related to climate-change effects requires an integrated protocol for assessing these risks. As more seafood is being caught and brought to market, new contaminants produced, and anthropogenic- and climate change-induced impacts becoming more complex, Member States must keep abreast with the increasing analytical requirements.

PROPOSAL OBJECTIVE

Support Member States in the reliable and rapid monitoring and assessment of diverse contaminants in seafood through the development and harmonization of fit-for-purpose analytical methods to verify seafood health, provenance and authenticity.

KEY TECHNOLOGY

- Nuclear-based methods for identification of biotoxins in seafood.
- Radiotracer techniques to assess movement and transformation of biologically relevant contaminants (e.g., 210Po, methyl-Hg, flame retardants).
- Stable isotopes for seafood provenance and authentication.
- Precise isotope ratio measurements to source and better understand contaminant fate and provenance in marine biota.
- Novel use of complimentary nuclear techniques such as ion and XRF beam methods for seafood safety applications.

PROPOSED ACTIVITIES

- Research and development of nuclear and isotopic technology to assess seafood safety.
- Perform controlled experiments on key seafood species using a multi stressor approach that includes climate change parameters and contaminants.
- Produce missing certified reference material for stable isotopes, long lived radionuclides and emerging contaminants in seafood.

DURATION

Five years

BENEFICIARY COUNTRIES

All coastal IAEA Member States.

EXPECTED OUTCOMES

Improved analytical tools available to Member States to deal with issues of seafood safety, seafood provenance and authentication. Ultimately, the project aims to secure seafood as a safe source of nutrition.

TOTAL ESTIMATED BUDGET

Budget (EUR) with 7% PSC included

Year 1	363 800
Year 2	363 800
Year 3	363 800
Year 4	342 400
Year 5	342 400
Total	**1 776 200**

IAEA Nuclear Sciences and Applications

20-01121E

Environment

Concept Note

Ocean Acidification

International Coordination Centre (OA-ICC)
Phase III

THE RATIONALE

Ocean acidification, often referred to as "the other CO_2 problem" alongside climate change, is a major threat to marine ecosystems worldwide, and is the specific focus of the Target 3 of the UN Sustainable Development Goal (SDG) 14. Global concern about ocean acidification and related stressors continues to rise as reports and studies confirm previous projections and expected effects. While the research on ocean acidification is quickly advancing in both scale and complexity, the impacts of ocean acidification on many organisms, ecosystems and livelihoods are still mostly unknown and there is a pressing need for sustained international coordination and collaboration. The IAEA's Ocean Acidification International Coordination Centre (OA-ICC) works with partners across the globe to advance ocean acidification science and international collaboration. Since its launch in 2013, the Centre provides opportunities for training and networking for all Member States, promotes the development of standardized methodologies and best practices, supports the Global Ocean Acidification Observing Network (GOA-ON), and provides access to related databases and resources.

PROPOSAL OBJECTIVE

Establish a responsive international research community on ocean acidification, building on past successes and a network of international collaborations and partnerships that have been nurtured since the project's inception seven years ago in support of SDG 14.

KEY RESOURCES

- Data bases and portals: the OA-ICC will continue to ensure that ocean acidification data is widely accessible, searchable, and archived in a consistent way.
- News stream and web site: The OA-ICC will continue to raise awareness about ocean acidification and related stressors.

PROPOSED ACTIVITIES

- Advance ocean acidification science and coordination through the development of standardized methodology and best practices.
- Support capacity enhancement and provide opportunities for training and scientific collaboration.
- Promote efficient communication between scientists and stakeholders.

DURATION

Five years

BENEFICIARY COUNTRIES

All coastal IAEA Member States.

EXPECTED OUTCOMES

Increased coordination and collaboration on ocean acidification among Member States. In addition, the project would lead to enhanced capacity in coastal Member States to monitor ocean acidification and to assess risks to their ecosystems, resources, and livelihoods and to report towards the Target 3 of the Sustainable Development Goal 14.

TOTAL ESTIMATED BUDGET

Budget (EUR) with 7% PSC included

Year 1	560 000
Year 2	560 000
Year 3	560 000
Year 4	560 000
Year 5	560 000
Total	**2 800 000**

IAEA Nuclear Sciences and Applications

20-01122E

Food & Agriculture

Climate Smart Agriculture

Improving Agricultural Practices to Enhance Resource Use Efficiency and Reduce Greenhouse Gas Emissions in Intensively Managed Agricultural Systems

THE RATIONALE

Increased greenhouse gas (GHG) emissions which contribute to climate change and global warming, are having a profound impact on the sustainability of agricultural production systems. Yet, at the same time, agriculture and land use changes contributing to 25% GHG production through intensive farming methods, as countries struggle to meet the food demands of rapidly rising populations. It is therefore important to find an integrated solution to reduce GHG emissions, making soils more resilient to climate change and increasing crop productivity at the same time.

PROPOSAL OBJECTIVE

Assist Member States to find integrated solutions to enhance nutrient use efficiency on farms while reducing GHG emissions through adaptation and mitigation practices and technologies. A specific focus of the project will be to quantify nitrous oxide (N_2O) and ammonia (NH_3) and to identify their exact sources using the ^{15}N isotopic technique, and the use of ^{13}C isotope to assess sources of carbon dioxide (CO_2), methane (CH_4), and carbon (C) sequestered in the soil.

KEY TECHNOLOGY

- Nuclear technology of ^{15}N and ^{13}C to precisely measure GHGs and identify their source for better management.
- Develop Climate Smart Agricultural practices to enhance agricultural production for achieving food security.

PROPOSED ACTIVITIES

- Develop, evaluate and validate methodologies and guidelines to measure N_2O, CH_4, CO_2, NH_3 and C-sequestration. Stable isotopes of ^{15}N and ^{13}C as well as conventional techniques will be used for quantifying GHGs, nitrogen use efficiency and C sequestration. This also includes the provision of standard operating procedures, guidance and technical support.
- Outreach and promotion include producing pamphlets for farmers on climate smart agricultural practices, and the publication of research results in popular media and in peer-reviewed journals. The objective is to improve the exchange of ideas, knowledge and experience, and to facilitate interaction.
- Organize technical workshops and develop technology packages. These will focus on the results of GHG measurements and C-sequestration under different land uses, as well as developing packages for reducing N_2O and NH_3 emissions and improving soil fertility, crop productivity and resource-use efficiency in intensively managed agricultural production systems.

Concept Note

DURATION

Five years

BENEFICIARY COUNTRIES

IAEA Member States in Asia and the Pacific

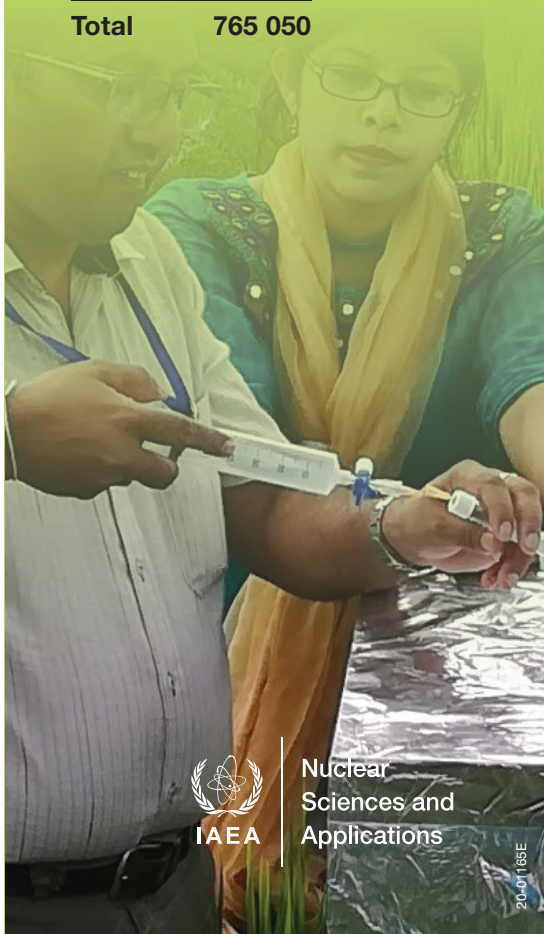
EXPECTED OUTCOMES

It is expected that better management of nitrogen used in agricultural processes will result in reduced GHGs. Equally, more efficient use of nitrogen offers scope for increased farm production and profitability. An improved environmental footprint will help grow the market appeal and reputation of the produce.

TOTAL ESTIMATED BUDGET

Budget (EUR) with 7% PSC included

Year 1	444 050
Year 2	96 300
Year 3	58 850
Year 4	64 200
Year 5	101 650
Total	**765 050**



IAEA Nuclear Sciences and Applications

20-01165E

Food & Agriculture

Concept Note

Emerging Infectious Diseases (COVID-19)

Detection of Emerging and Re-emerging Transboundary Animal and Zoonotic Pathogens at the Animal-Human Interface

THE RATIONALE

More than 75% of the pathogens causing infectious diseases in humans originated in the animal reservoir. "Emerging infectious diseases" (EID) affecting humans have become more frequent and more volatile (i.e. Bovine spongiform encephalopathy (BSE), Avian Influenza, Ebola-Reston, Severe Acute Respiratory Syndrome (SARS), Middle-East Respiratory Syndrome (MERS) and very recently COVID-19). These pathogens evolve, may become fully adapted in human population or are maintained in the environment by the animals which may transmit the pathogens to humans (causing zoonotic diseases). Increased frequency of the emergence of zoonotic infectious diseases is exasperated by globalization, climactic changes and urbanization. Veterinary laboratories play an essential role in detecting and tracking the circulation of zoonotic agents at the human-animal interface. To be able to implement early and rapid EID detection as well as animal surveillance and monitoring, fit-for-purpose tests need to be developed, adapted and validated for the variety of species involved.

PROPOSAL OBJECTIVE

Assist laboratories in Member States in improving their capacities for the early detection and surveillance for emerging infectious disease' pathogens at the wildlife-livestock interface. To develop laboratory tools that enable reasearch and surveillance in animals to track the circulation and origin of novel or re-emerging zoonotic diseases, moreover, to strenghten the laboratory preparedness as well as the diagnostic and research capacities of veterinary laboratories concerning emerging diseases.

KEY TECHNOLOGY

- Nuclear and nuclear-derived immunological and molecular technologies for the rapid disease detection (e.g. ELISA, RIA, PCR, gene sequencing).
- Stable isotope application to track animal movements.
- Radio-immunoassays and irradiation technologies to improve vaccine efficacy and vaccination effectiveness.

PROPOSED ACTIVITIES

- Develop, validate and transfer technologies, including novel and advanced nuclear derived and molecular techniques for early detection, surveillance and control of emerging diseases through trainings, workshops and field missions.
- Maintain and further strengthen laboratory preparedness to rapidly and accurately diagnose diseases and monitor pathogens circulation at the human-animal interface through capacity building programmes.
- Strengthen surveillance activities and applied research skills through experts exchange, laboratory assessments, collaborative applied research program and procurements.
- With reference to EID, harmonize laboratory testing procedures and reference material and promote the implementation of laboratory quality system and biosafety.

DURATION

Three years

BENEFICIARY COUNTRIES

All IAEA Member States.

EXPECTED OUTCOMES

Surveillance and monitoring of pathogens circulation associated with rapid confirmation and notification of emerging infectious disease outbreaks will contribute to faster implementation of control measures, strengthening biosafety and governance in partner laboratories and enhancing their technical and scientific visibility. Ultimately, increased livestock production and trade due to reduced burden of disease.

TOTAL ESTIMATED BUDGET

Budget (EUR) with 7% PSC included

Year 1	1 177 000
Year 2	642 000
Year 3	642 000
Total	**2 461 000**

IAEA Nuclear Sciences and Applications

20-01168E

Food & Agriculture

Transboundary Plant Diseases

Mutation Breeding R&D and Networking to Fight Coffee Leaf Rust

Concept Note

THE RATIONALE

Coffee is the second most traded commodity in the world after crude oil. But around the globe, a fungal disease that kills coffee plants by withering its leaves is decimating crops and seriously impacting coffee-dependent economies. Coffee leaf rust is not new, but as climate change brings the warmer and wetter conditions that nurture the disease, countries in Latin America have been facing an unprecedented epidemic. Coffee yields have fallen drastically, and the livelihoods of millions of people are under threat.

PROPOSAL OBJECTIVE

To establish a global R&D network, with its core in Latin America, based on mutation breeding and plant biotechnologies in coffee that can improve breeding efficiency for leaf-rust resistance. IAEA continues to support Member States in their efforts to prevent the spread of new and emerging plant diseases using nuclear techniques, and scientists breed plant varieties that are disease resistant, or can tolerate severe or changing climatic conditions.

KEY TECHNOLOGY

- Radiation-induced mutagenesis for the introduction of novel genetic diversity in plants to improve disease resistance.
- Nuclear and associated biotechnologies for high-throughput induction and screening of disease resistance (e.g. in vitro cell/tissue culture).
- Nuclear-derived molecular marker packages for rapid development of improved crop varieties.

PROPOSED ACTIVITIES

- Develop a R&D network for technology testing, validation and dissemination in endemic disease hotspots.
- Develop and/or optimize high throughput, low-cost screening techniques for rust-resistance alleles, and in vivo and in vitro cell/tissue culture techniques for mutation induction in coffee.
- Characterize mutants with disease resistance by field screening in endemic hotspots.
- Validate technology packages developed for resistance markers and in vitro techniques; prepare protocols and guidelines.
- Transfer material and validated technology packages through technical workshops

DURATION

Four years

BENEFICIARY COUNTRIES

IAEA Member States in Latin America and the Caribbean

EXPECTED OUTCOMES

Long-term, the potential economic impact expected to be derived from the establishment of coffee leaf rust resistant varieties for Latin America is above US $1 billion per year. Considering the time-to-yield of coffee plantations, this impact should be achievable within 10-12 years of project completion.

TOTAL ESTIMATED BUDGET

Budget (EUR) with 7% PSC included

Year 1	218 120
Year 2	209 163
Year 3	209 163
Year 4	223 898
Total	**860 344**

IAEA Nuclear Sciences and Applications

20-01169E

Environment

Concept Note

Contamination in Marine Environment

Assessment and Communication of Marine Environmental Radioactivity

THE RATIONALE

In recent years, there has been a marked increase in scientific and public interest in radioactive contamination of the marine environment. Information such as the way in which radionuclides are transported by ocean currents, or how they are diluted and taken up by marine organisms, is vital to understanding the impact ocean radioactivity has on marine life and, consequently, on humans.

Data publications often rely on the work of a single institute and therefore present a fragmented view of world ocean radioactivity. Global integration of the data reported by Member States is needed to provide a reference for further marine radioactivity assessment and radiotracer studies.

PROPOSAL OBJECTIVE

This project aims to build a comprehensive assessment of levels and trends of ocean radioactivity on regional and global scales in the years 2010-2020. Through the IAEA's MARiS (MARine information System) portal, it will increase the amount of data and information available to scientists, environmental managers and the public.

KEY TECHNOLOGY

- Radiotracer techniques to apportion sources and to assess dispersion and transfer of radionuclides in the marine environment.
- Global marine radioactivity advanced data analysis and modelling for baseline and space-time evolution assessment as a basis for informed decision-making in case of radiological or nuclear accident impacting the marine environment.
- Advanced information technology to sustain Internet access to data and information on marine radioactivity.

PROPOSED ACTIVITIES

- Assess natural and man-made worldwide marine radioactivity. Data from 2010-2020 will be compared and study of trends and environmental impacts will be carried out.
- Develop database content and enhance the MARiS database portal. New data and easy to understand information on marine radioactivity will be added and made available online. The aim is to include access to measurement/observation data and information on marine radioactivity, accessible to a broader audience.
- Involvement of major marine radioactivity data producers with a geographically representative distribution. At least 25 scientists need to be involved in the project's workshops to sustain communication for bilateral and multilateral collaboration. The IAEA will support this scientific network through a collaboration platform, video-conferencing and workshops.
- Produce a scientific project report and a project eBrochure.

DURATION

Four years

BENEFICIARY COUNTRIES

All IAEA Member States.

EXPECTED OUTCOMES

Member States will have access to a database and an IAEA publication on marine radioactivity updated with all data produced by the Member States' laboratories since the year 2000.

TOTAL ESTIMATED BUDGET

Budget (EUR) with 7% PSC included

Year 1	120 000
Year 2	120 000
Year 3	10 000
Year 4	55 000
Total	**305 000**

20-01171E

Food & Agriculture

Ongoing Project

VETLAB Asia

Support Veterinary Diagnostics Laboratories in Asia to Diagnose and Control Animal and Zoonotic Diseases – Phase II

THE RATIONALE

Transboundary Animal Diseases (TADs) and zoonoses are threating the food security and the livelihoods of livestock farmers globally. The situation is worsening due to climatic changes, movements of people and goods and the transboundary movement of wildlife, leading to increasing numbers of animal and zoonotic disease outbreaks such as Ebola, Rift Valley Fever, African Swine Fever, Lumpy Skin Disease, and Avian Influenza.

OBJECTIVE

Assist laboratories in Member States to improve their technical capacities for the early and rapid diagnosis and prevention of transboundary animal and zoonotic diseases through technology transfer and capacity building activities of the network of veterinary laboratories – VETLAB.

KEY TECHNOLOGY

- Nuclear and nuclear-derived immunological and molecular technologies for the rapid disease detection (e.g. ELISA, RIA, PCR, gene sequencing).
- Stable isotope application to track animal movements.
- Radio-immunoassays and irradiation technologies to improve vaccine efficacy and vaccination effectiveness.

PROPOSED ACTIVITIES

- Develop and transfer technologies for early detection, surveillance and control of animal and zoonotic diseases.
- Strengthen laboratory capacity, skills and preparedness to rapidly and accurately diagnose diseases with a timely response through experts meetings.
- Strengthen surveillance activities and applied research skills through experts exchange, laboratory assessments, procurement and distribution of Standard Operating Procedures (SOPs).
- Harmonize laboratory testing procedures and reference material through external quality assurance exercises.
- Increase visibility of the Network and facilitate exchange of information, through inter-laboratory exchange of expertise, joint publications and support in the participation in scientific meetings.

DURATION

Five years

BENEFICIARY COUNTRIES

Current VETLAB Partners in Asia and other IAEA Member States.

EXPECTED OUTCOMES

Early warning laboratory system will be developed for the rapid identification of emerging and re-emerging animal and zoonotic diseases. Rapid confirmation and notification of infectious disease outbreaks will contribute to faster control measures, strengthening biosafety and governance in partner laboratories and enhancing their scientific visibility. The project will focus on developing sustainable mechanisms for material and reagents exchange, as well as expertise, knowledge and information sharing among VETLAB partner laboratories.

TOTAL ESTIMATED BUDGET

Budget (EUR) with 7% PSC included

Year 1	658 050
Year 2	679 450
Year 3	604 550
Year 4	604 550
Year 5	535 000
Total	**3 081 600**

IAEA Nuclear Sciences and Applications

20-01110E

Food & Agriculture

Ongoing Project

VETLAB Africa

Support Veterinary Diagnostics Laboratories in Africa to Diagnose and Control Animal and Zoonotic Diseases – Phase II

THE RATIONALE

Transboundary Animal Diseases (TADs) and zoonoses are threating the food security and the livelihoods of livestock farmers globally. The situation is worsening due to climatic changes, movements of people and goods and the transboundary movement of wildlife, leading to increasing numbers of animal and zoonotic disease outbreaks such as Ebola, Rift Valley Fever, African Swine Fever, Lumpy Skin Disease, and Avian Influenza.

OBJECTIVE

Assist laboratories in Member States to improve their technical capacities for the early and rapid diagnosis and prevention of transboundary animal and zoonotic diseases through technology transfer and capacity building activities of the network of veterinary laboratories – VETLAB.

KEY TECHNOLOGY

- Nuclear and nuclear-derived immunological and molecular technologies for the rapid disease detection (e.g. ELISA, RIA, PCR, gene sequencing).
- Stable isotope application to track animal movements.
- Radio-immunoassays and irradiation technologies to improve vaccine efficacy and vaccination effectiveness.

PROPOSED ACTIVITIES

- Develop and transfer technologies, including novel and advanced nuclear/nuclear-derived immunological and molecular techniques for early detection, surveillance and control of animal and zoonotic diseases.
- Maintain and further strengthen laboratory capacity, skills and preparedness to rapidly and accurately diagnose diseases with a timely response through experts meetings.
- Strengthen surveillance activities and applied research skills through experts exchange, laboratory assessments, procurement and distribution of Standard Operating Procedures (SOPs).
- Harmonize laboratory testing procedures and reference material and promote the implementation of laboratory quality system and biosafety through external quality assurance exercises.
- Increase visibility of the Network and facilitate exchange of information and knowledge through meetings, inter-laboratory exchange of expertise and know-how, joint publications and support in the participation in scientific meetings.

DURATION

Five years

BENEFICIARY COUNTRIES

Current VETLAB Partners in Africa and other IAEA Member States.

EXPECTED OUTCOMES

Early warning laboratory system will be developed for the rapid identification of emerging and re-emerging animal and zoonotic diseases. Rapid confirmation and notification of infectious disease outbreaks will contribute to faster control measures, strengthening biosafety and governance in partner laboratories and enhancing their scientific visibility. The project will focus on developing sustainable mechanisms for material and reagents exchange, as well as expertise, knowledge and information sharing among VETLAB partner laboratories.

TOTAL ESTIMATED BUDGET

Budget (EUR) with 7% PSC included

Year 1	952 300
Year 2	995 100
Year 3	909 500
Year 4	909 500
Year 5	754 350
Total	**4 520 750**

IAEA Nuclear Sciences and Applications

20-01111E

Food & Agriculture

Ongoing Project

Human Disease Vectors

Development and Validation of the SIT to Control Disease Transmitting Mosquitoes

THE RATIONALE

Mosquitoes, bloodsucking insects that can carry pathogenic micro-organisms, are vectors of diseases such as malaria, Zika, dengue, mayaro, yellow fever and chikungunya, that may result in severe illness or death. Causalities related to *Aedes* and *Anopheles* mosquito vectors are increasing, and World Health Organization (WHO) has recently underlined the need for new innovative control tools in their Global Vector Control Response 2017–2030. With no vaccines or safe, inexpensive drugs yet available, the sterile insect technique (SIT) plays a decisive role in controlling populations of disease transmitting mosquitoes as an environmentally friendly insect pest control method.

OBJECTIVE

The IAEA, in collaboration with the Food and Agriculture Organization (FAO) of the United Nations, has developed different SIT packages for use against major disease vectors, such as *Aedes* and *Anopheles* mosquitoes. The IAEA aims to continue advancing in the research and validation of the SIT to help Member States control the spread of mosquito-borne diseases and provide a response to future mosquito outbreaks.

KEY TECHNOLOGY

- Gamma or X-rays to induce sterility and refinement of the irradiation procedures.
- Sub doses of irradiation to induce mutations in genetic sexing strains to allow male-only mosquito releases.
- The sterile insect technique (SIT) package developed, optimized and validated to control human disease vectors.

PROPOSED ACTIVITIES

- Research and development optimizing SIT against *Aedes* and *Anopheles,* through provision of human resources and laboratory equipment, development and testing of genetic sexing lines and mosquito sex separation methods.
- Improve efficiency and cost-effectiveness of mosquito mass-rearing, sterilization, handling, transport and release procedures.
- Identify pilot sites and improve SIT packages under local field situations through technical support and field trials.
- Increase visibility and disseminate results through publications, international collaboration and support in the participation in scientific meetings.
- Technical backstopping of project activities through technical advisory missions, management of consultant and experts meetings.

DURATION

Three years

BENEFICIARY COUNTRIES

All IAEA Member States

EXPECTED OUTCOMES

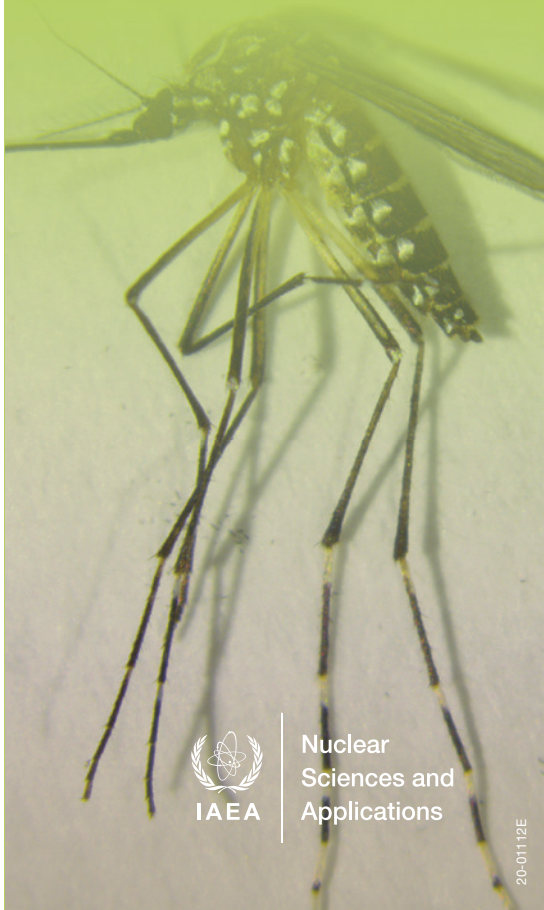
The project will focus on developing and optimizing SIT packages against disease transmitting *Aedes* and *Anopheles* mosquitoes. It will help Member States control the spread of viruses, such as malaria, Zika, dengue, mayaro, yellow fever and chikungunya, and provide a substantial response to future mosquito outbreaks.

TOTAL ESTIMATED BUDGET

Budget (EUR) with 7% PSC included

Year 1	1 241 600
Year 2	1 341 600
Year 3	1 341 600
Total*	**3 924 800**

*Partial funds already received. Further support of estimated €2.63M is required.



IAEA Nuclear Sciences and Applications

20-01112E

Food & Agriculture

Ongoing Project

Creation of Tsetse-free Zones in Senegal

Improve Livestock Productivity in West Africa through the Creation of Sustainable Tsetse-free Zones

THE RATIONALE

Tsetse flies are vectors transmitting human African trypanosomosis (HAT) or "sleeping sickness" in humans, and African animal trypanosomosis (AAT) or "nagana" in livestock, affecting livestock-keeping and farming and causing hunger and poverty.. In 2005, due to the gravity of the tsetse infestation, Senegal embarked on a project supported by the IAEA to eradicate the tsetse population in the region of Niayes using an area-wide integrated pest management approach, including the sterile insect technique (SIT). Having reached suppression of 99% of the tsetse population continued support and further expansion to additional affected areas in the eastern part of the country, Sine Saloum, are requested. With a vast majority of the rural communities dependent on agriculture, the removal of tsetse and trypanosomosis would permit increased local agricultural production, socio-economic and market access development, and alleviate hunger and poverty.

OBJECTIVE

To assist Member States in sustainably removing tsetse flies and relieving the trypanosomosis burden in West Africa, while continuing to advance methods development and cost-efficiency of the SIT to create sustainable tsetse-free zones.

KEY TECHNOLOGY

- Gamma or X rays to induce sterility and refinement of the irradiation procedures.
- New methods (i.e. near infrared technology) to separate by sex the tsetse flies and allow male-only fly releases.

PROPOSED ACTIVITIES

- Methods development to further optimize the SIT against *Glossina palpalis gambiensis* and *Glossina morsitans submorsitans* through provision of human resources and laboratory equipment, development and testing of release methods, handling procedures and fly sex separation methods.
- Improve efficiency and cost-effectiveness of tsetse fly mass-rearing, sterilization, handling, transport and release procedures.
- Improve SIT packages under local field situations through technical support and field trials.
- Completion of feasibility studies, baseline data collections and development and implementation of intervention strategies.

DURATION

Five years

BENEFICIARY COUNTRIES

All IAEA Member States

EXPECTED OUTCOMES

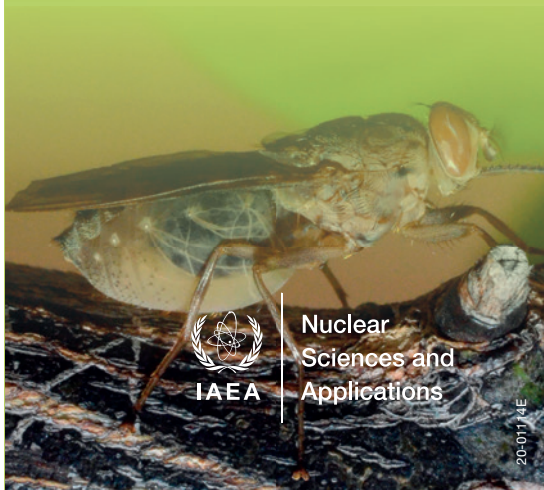
Relieve the trypanosomosis burden in the area and contribute to the capacity building in other countries in West Africa in relation to tsetse control using SIT. The project will focus on further optimizing and increasing the cost effectiveness of the SIT package against tsetse flies to help Member States create sustainable tsetse free zones to reduce trypanosomosis burden and increase local agricultural production and ensure sustainable socio-economic development.

TOTAL ESTIMATED BUDGET

Budget (EUR) with 7% PSC included

Year 1	649 276
Year 2	780 351
Year 3	912 175
Year 4	922 875
Year 5	837 275
Total*	**4 101 952**

*Partial funds already received. Further support of estimated €3.95M is required.



20-01144E

Water Resources

Conserving Earth's Oldest Groundwater Resources

Using Noble Gas Isotopes to Determine Replenishment Rates of Large and Deep Aquifer Systems

THE RATIONALE

Water is an essential natural resource; however most of Earth's water is unpotable seawater. Around 96 % of available freshwater is stored in underground aquifers and <0.2% is available as surface water. Billions of Euros are spent worldwide on water security, and costs are expected to rise with population growth, climate change, pollution, and high-groundwater-use industries (agriculture, hydraulic fracturing, etc.). Aquifers are replenished very slowly, are unevenly distributed around the world and are often transboundary or variable in water quality. Increasingly, non-renewable ancient and deep aquifers are being exploited at great cost and without reliable data for sustainable exploitation. As a result, cooperative management supported by science-based sustainability assessments and conservation measures are essential. Knowing the age of groundwater allows scientists to accurately determine aquifer replenishment rates to avoid over-exploitation and to map vulnerability to pollution. Innovative noble gas radioisotope methods to determine groundwater ages, like Krypton-81 and Argon-39, are ideal since noble gases do not react with surrounding rock environment. Used with classic radioisotopes Tritium and Carbon-14, accurate groundwater ages spanning a few decades to over one million years can now be determined.

OBJECTIVE

Assist Member States to build capacities to effectively manage and conserve their ancient and deep groundwater aquifer resources through science-based data by building and operating a state-of-the-art laser Atom Trap Trace Analysis (ATTA) system for routine Krypton-81 and Argon-39 analyses of groundwater in the IAEA Isotope Hydrology Laboratory in Vienna.

KEY TECHNOLOGY

- ATTA – an ultra-sensitive, laser-based atom counting instrument for quantifying ultra-trace (one part in one thousand trillion) levels of naturally radioactive Krypton-81 and Argon-39 from groundwater for dating.
- Krypton-81 and Argon-39 allow reliable water replenishment determinations for groundwaters between a few thousand and over one million years in age.

PROPOSED ACTIVITIES

- Custom build and operate state-of-the-art ATTA isotope analysis systems for Krypton-81 and Argon-39 radioisotope groundwater age dating.
- Establish guidelines for routine collection and analysis of ultra-low-level noble gases.
- Provide access to advanced groundwater dating techniques to Member States.

Ongoing Project

6 CLEAN WATER AND SANITATION

SUSTAINABLE DEVELOPMENT GOALS

DURATION

Five years

BENEFICIARY COUNTRIES

All IAEA Member States

EXPECTED OUTCOMES

Availability of noble gas radioisotope data for Member States in mapping groundwater age distributions and assessing dynamics and vulnerability as well as understanding hydrogeological pathways and replenishment of old groundwater. The project will support decision makers in Member States in sound water management policies.

TOTAL ESTIMATED BUDGET

Budget (EUR) with 7% PSC included

Year 1	695 500
Year 2	267 500
Year 3	535 000
Year 4	267 500
Year 5	224 700
Total*	**1 990 200**

*Partial funds already received. Further support of estimated €1.92M is required.

Radioisotope Production and Radiation Technology

Ongoing Project

Radiopharmaceuticals

Production of Zirconium-89 and Development of Zirconium-89 Radiopharmaceuticals Coordinated Research Project (CRP)

THE RATIONALE

Positron emission tomography (PET) is a non-invasive imaging modality which is crucial in the management of non-communicable diseases such as cancer, as well as an important tool for understanding the disease process and evaluation of new drugs and therapy. Currently, the biomedical research is looking for biomolecules as future drugs for personalized treatment of diseases – radiopharmaceuticals. The readily available PET radiopharmaceuticals normally use short-lived radionuclides which possess limitations for imaging and require days to localize in the target tissues. Zirconium-89 (Zr-89), with a longer half-life and a relatively low-energy positron decay, has therefore recently gained interest as a preferred radionuclide for imaging slow kinetic biochemical processes. However, Zr-89 production, purification, quality control and radiopharmaceutical development require further standardization and optimization for use in clinical applications.

OBJECTIVE

Strengthen expertise and capabilities of Member States in the production and quality control of Zr-89 radioisotope, and Zr-89 radiopharmaceuticals, covering all aspects of development for clinical diagnostic imaging.

KEY TECHNOLOGY

- Radioisotope production of PET Radionuclide Zr-89 using Cyclotron (target development, optimization of irradiation parameters, separation and purification procedures).
- Zr-89 based radiopharmaceutical development.

PROPOSED ACTIVITIES

- Research and development related to Zr-89 production using medical cyclotrons through quality control procedures, optimization of separation and purification methods.
- Production of guidelines for the preparation, quality control of Zr-89 labelled molecules with focus on developing Zr-89 radiopharmaceuticals.
- Research and development related to *in-vitro* specificity evaluations and preclinical studies in laboratory animal models.

DURATION

Four years

BENEFICIARY COUNTRIES

All IAEA Member States

EXPECTED OUTCOMES

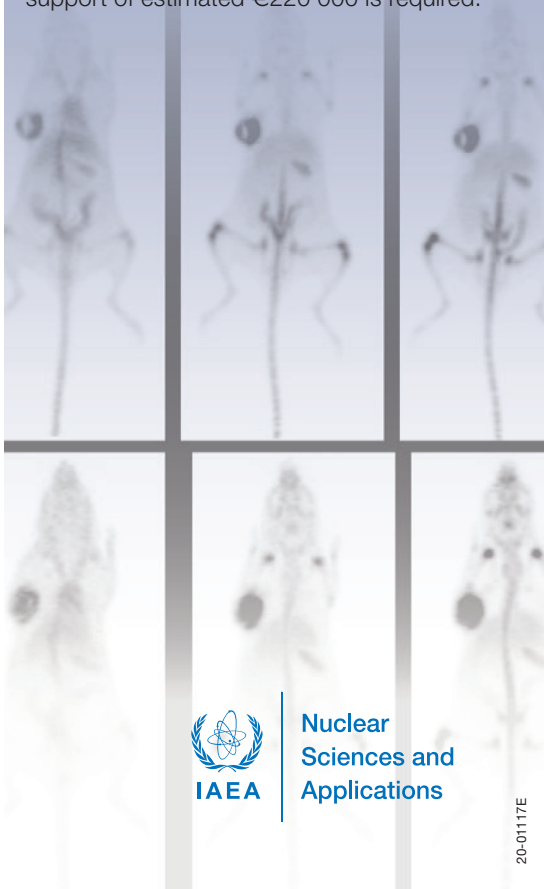
Enhanced capabilities of Member States for the production and quality control of Zr-89 using available medical cyclotrons worldwide, and development of Zr-89 radiopharmaceuticals for ultimate use in PET imaging for early detection, screening, and follow-up of human malignant diseases, such as breast and intestinal cancers.

TOTAL ESTIMATED BUDGET

Budget (EUR) with 7% PSC included

Year 1	90 000
Year 2	60 000
Year 3	80 000
Year 4	80 000
Total*	**310 000**

*Partial funds already received. Further support of estimated €220 000 is required.



IAEA Nuclear Sciences and Applications

20-01117E

Human Health

Ongoing Project

Cervical Cancer Radiotherapy

Promoting the Health of Women and Girls by Enhancing Education and Quality Assurance

THE RATIONALE

Cervical cancer is the second most common cancer in women in less developed middle-income countries (LMICs). Radiotherapy, including brachytherapy, plays an important role in controlling cervical cancer and quality of radiotherapy is linked to control of the cancer and survival of the patient. Unfortunately, educational activities and Quality Assurance support is limited in many LMICs which impacts the outcomes for this disease in women. The IAEA is a founding member of the UN Joint Global Programme on Cervical Cancer – Prevention and Control (UNJGP). UNJGP's main goal is to reduce cervical cancer mortality by 30% by 2030, together with reduction in incidence of cervical cancer and improvement in survival, however, additional funding gaps exist for Quality Assurance and education that must go hand-in-hand with activities in prevention and screening led by other agencies.

OBJECTIVE

Increase educational initiatives supporting radiation treatment facilities in Member States that diagnose and treat cervical cancer, including radiotherapy provision of palliative care, and incorporate Quality Assurance to help women and girls to access quality services equitably.

KEY TECHNOLOGY

- Radiotherapy and diagnostic medical imaging (resource sparing radiotherapy).
- Radiation oncology and cancer treatment for the clinical utilization of advanced radiotherapy technologies for cancer.
- Medical physics.

PROPOSED ACTIVITIES

- Transfer knowledge and enhance professional development of cervical cancer radiation therapy professionals through hands-on educational seminars, regional telemedicine networks, eLearning modules and a central database for national cancer treatment facilities.
- Facilitate conformity of technical and quality system requirements through development of treatment guidelines for cervical cancer, codes of practice, quality assurance and evaluation in Member States (QUATRO, QUADRIL and QUANUM missions).
- Research and development through support and undertaking of clinical research (resource sparing radiotherapy).

DURATION

Five years

BENEFICIARY COUNTRIES

All IAEA Member States

EXPECTED OUTCOMES

Improved efficacy of radiotherapy and nuclear medicine teams to support the UNJGP's goal of a 30% relative reduction in cervical cancer mortality by 2030 in participating countries. Ultimately, the project will focus on improving quality of radiotherapy and diagnostic imaging for cases with locally advanced cervical cancer.

TOTAL ESTIMATED BUDGET

Budget (EUR) with 7% PSC included

Year 1	139 100
Year 2	203 300
Year 3	203 300
Year 4	160 500
Year 5	160 500
Total*	**866 700**

*Partial funds already received. Further support of estimated €775 000 is required.

IAEA Nuclear Sciences and Applications

20-01118E

Human Health

Ongoing Project

Childhood Cancer

Applying Nuclear Nutrition Techniques to Improve Outcomes for Childhood Cancer in Low and Middle-Income Countries
Coordinated Research Project (CRP)

THE RATIONALE

Survival rates for childhood cancer in Low and Middle-Income Countries (LMICs) are between 10-30% as opposed to 80% in High Income Countries. Other than the striking issues of misdiagnosis of cancer, inaccessible treatment and scarcity of specialized health professionals, malnutrition also plays a pivotal role in lower survival rates of children with cancer. Whereas new cancer therapies are not readily accessible and other solutions to improve survival may not be feasible in LMICs, a focus on nutritional management could serve to raise the standard of care and improve clinical outcomes with simple low-cost strategies, such as educating staff, identifying malnutrition, and providing low-cost nutrition interventions. To support LMICs in employing the most effective evidence-based nutrition care, quality research in LMICs is required to understand the interlinking relationships between cancer, nutritional status and clinical outcomes.

OBJECTIVE

Support Member States in using nuclear techniques to generate evidence on how to improve survival rates in childhood cancer patients through understanding of how cancer affects nutritional status clinical outcomes and nutritional interventions.

KEY TECHNOLOGY

- Stable isotope dilution techniques to determine body composition and total energy expenditure.
- Dual Energy X-ray Absorptiometry to assess body composition and bone density.

PROPOSED ACTIVITIES

- Organization of coordination meetings to formulate the work programmes, share progress, and plan dissemination.
- Development of R&D network of participating institutions to ensure a collection of quality data and harmonization of nutrition nuclear assessment procedures among the partners.
- Development of guidance material on the nutritional and lifestyle support during childhood cancer treatment.

DURATION

Five years

BENEFICIARY COUNTRIES

All IAEA Member States

EXPECTED OUTCOMES

Improved understanding of the interlinking relationships between cancer, body composition, energy expenditure, interventions and clinical outcomes in childhood cancer. The project will also provide guidance to childhood cancer centres to implement and monitor nutrition supportive care programs to prevent premature deaths from childhood cancer in LMICs.

TOTAL ESTIMATED BUDGET

Budget (EUR) with 7% PSC included

Year 1	32 100
Year 2	74 900
Year 3	32 100
Year 4	32 100
Year 5	32 100
Total*	**203 300**

*Partial funds already received. Further support of estimated €171 300 is required.

IAEA Nuclear Sciences and Applications

20-01119E

Nuclear Science

Neutron Science Facility

Provide Member States with Access to Neutrons and their Applications

Ongoing Project

DURATION

Three years

BENEFICIARY COUNTRIES

All IAEA Member States

EXPECTED OUTCOMES

The project will lead to enhanced capacity building through education and hands-on-training by utilising the Neutron Science Facility. It will contribute to the promotion of and support to nuclear applications using neutron generators for research and a large variety of applications. In addition, specialized analytical services both to internal and external users will be expanded.

TOTAL ESTIMATED BUDGET

Budget (EUR) with 7% PSC included

Neutron generators	170 000
Shielding components	160 000
Instrumentation	330 000
Building & other infrastructure	330 000
TOTAL*	**990 000**

*Partial funds (~50 %) already received. Further support of estimated €490 000 is required to finalise the project and achieve full functionality.

THE RATIONALE

Compact neutron generators are electrically controlled neutron sources of low-medium intensity which are an attractive alternative to isotopic neutron sources and nuclear research reactors. Having been used for decades in the oil and mining industries, for exploration and on-line analysis, neutron generator applications have expanded into other areas. Presently these applications include education and training in neutron science, neutron activation analysis of various samples and objects, neutron radiography and tomography (complementary to X-ray imaging), radiotracer production for industrial applications, investigations related to security and safeguards applications, and testing of neutron sensors and detectors. Due to their compact size and transportability, which allows in-field utilization, neutron generators play a major role in solving problems of modern society related to in-situ control of industrial processes, monitoring of environmental pollution, water and air quality, forensics, cultural heritage, and others. The Neutron Science Facility (NSF) will expand IAEA's capabilities to support its Member States in capacity building, scientific research and diverse applications using neutrons. The implementation of the NSF has already started in 2019, benefiting from extra-budgetary contributions from Australia, Canada, Indonesia, Switzerland, the United Kingdom and the United States. Further support is required to complete the project by 2022.

OBJECTIVE

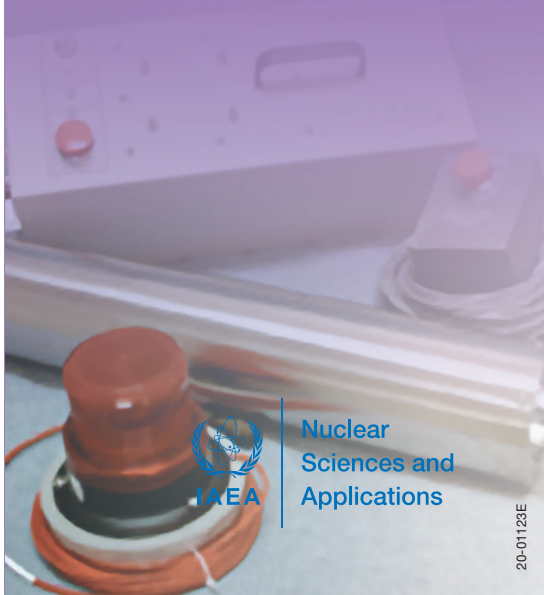
The project aims to establish a Neutron Science Facility at the IAEA laboratories in Seibersdorf and to address Member States' needs for training scientists and engineers in neutron science and technology applications.

KEY TECHNOLOGY

- Two neutron generators, providing fast neutrons in the energy range of fission (2,45 MeV) and fusion (14 MeV), and intensities up to 10^8 n/s.
- Advanced instrumentation to enable neutron science and technology capabilities including neutron activation analysis, neutron radiography and tomography, and radiotracer production.

PROPOSED ACTIVITIES

- Refurbish and adapt the building and its infrastructure for the NSF.
- Acquire, install and commission two neutron generators and associated instrumentation.
- Develop guidelines for access to the facility and its operation as well as to establish training programme.



IAEA Nuclear Sciences and Applications

20-01123E

Food & Agriculture

Nuclear Emergency Preparedness and Response

Global Networking for Improved Radiological and Nuclear Emergency Preparedness and Response in Food and Agriculture

THE RATIONALE

Radioactive release during a radiological or nuclear emergency can affect agriculture and food production. Response involves the timely identification of areas where produce grown cannot reach the consumer due to safety reasons. It is critical that the most up-to-date information on spatial and temporal distribution of radionuclides is available to decision-makers.

OBJECTIVE

Establish a global network enhancing worldwide capabilities of competent authorities in Member States responsible for monitoring radionuclides in food, soil, water and agriculture as a key to swift global and national response in an emergency. The network will encourage and facilitate collaborative operations, including the development of online data management and geo-visualization platforms; improve the effectiveness of sampling, analysis and mapping; develop optimised remediation planning, monitoring and evaluation strategies; and ensure proper and ongoing training of staff.

KEY TECHNOLOGY

- Field and laboratory-based monitoring of radioactive contamination in agriculture in the aftermath of a radiological or nuclear emergency, including a combination of low and high cost (precision) and throughput analytical methods.
- Multi-actor, real-time, cloud-based data management and visualization tools to improve decision-support and response to nuclear emergencies affecting food and agriculture.

PROPOSED ACTIVITIES

- Develop modules for training and train competent authorities in managing data on radionuclides in food and agriculture, including monitoring and use of monitoring data for remediation planning.
- Exchange information between Member States on sampling techniques and analytical measurements, data management and visualization and real-time monitoring.
- Develop, expand or customize data management and visualization strategies and tools.
- Prepare guidelines on participatory monitoring of data on radionuclides in food and agriculture for food producers and consumers.
- Perform simulation exercises covering different aspects of nuclear emergency response in food and agriculture.

Ongoing Project

DURATION

Three years

BENEFICIARY COUNTRIES

All IAEA and FAO Member States

EXPECTED OUTCOMES

Enhanced capabilities in Member States in addressing contamination of food producing areas during radiological and nuclear emergencies, and improved infrastructure and support to address challenges concerning contamination in these areas.

TOTAL ESTIMATED BUDGET

Budget (EUR) with 7% PSC included

Year 1	133 750
Year 2	304 950
Year 3	283 550
Total*	**722 250**

*Partial funds already received. Further support of estimated €672 250 is required.

IAEA Nuclear Sciences and Applications

20-01166E

Food & Agriculture

Ongoing Project

Transboundary Animal and Zoonotic Diseases

Creating Veterinary Laboratory Preparedness among Member States in Line with the Global Strategy for the Control and Eradication of *peste des petits ruminants* (PPR) using Nuclear and Nuclear-derived Techniques

THE RATIONALE

Peste des petits ruminants (PPR) is a highly infectious transboundary animal disease that primarily affects sheep, goats and small wild ruminants in almost 70 countries in Africa, the Middle East and parts of Asia. With mortality and morbidity rates as high as 80%, the disease causes an estimated loss of US $1.5 to 2 billion annually. As sheep and goats contribute significantly to the cash income and nutrition of small farmers in many countries, control of the disease is an essential element in the fight for global food security and poverty alleviation.

OBJECTIVE

The 2015 Global Control and Eradication Strategy for PPR and other small ruminant diseases lays out the general principles, strategies and tools to be used, including nuclear and nuclear-derived diagnostic and monitoring techniques. The IAEA, together with the Food and Agriculture Organization of the United Nations, and national veterinary extension services, will collaborate under this strategy to help eliminate the disease. In particular, it will draw on the IAEA's laboratory experience in this area and its strong network of Member State laboratories. It is important to note that PPR is earmarked as an eradicable disease, the second after rinderpest.

KEY TECHNOLOGY

- Nuclear and nuclear-derived immunological and molecular technologies for the rapid disease detection (e.g. ELISA, RIA, PCR, gene sequencing).
- Radio-immunoassays and irradiation technologies to improve PPR vaccine efficacy and vaccination effectiveness.

PROPOSED ACTIVITIES

- Develop and transfer technologies, including novel and advanced nuclear derived and molecular techniques for early detection, surveillance and control of PPR and related diseases through trainings, workshops and field missions.
- Maintain and further strengthen laboratory capacity, skills and preparedness to rapidly and accurately diagnose PPR and related diseases through trainings, fellowships and other capacity building programmes.
- Strengthen PPR surveillance activities and applied research skills through experts exchange, laboratory assessments, procurements and distribution of Standard Operating Procedures (SOPs).
- Harmonize laboratory testing procedures and reference material and promote the implementation of laboratory quality system and biosafety through the external quality assurance exercises.

DURATION

Three years

BENEFICIARY COUNTRIES

All IAEA Member States in Africa, Asia and the Middle East

EXPECTED OUTCOMES

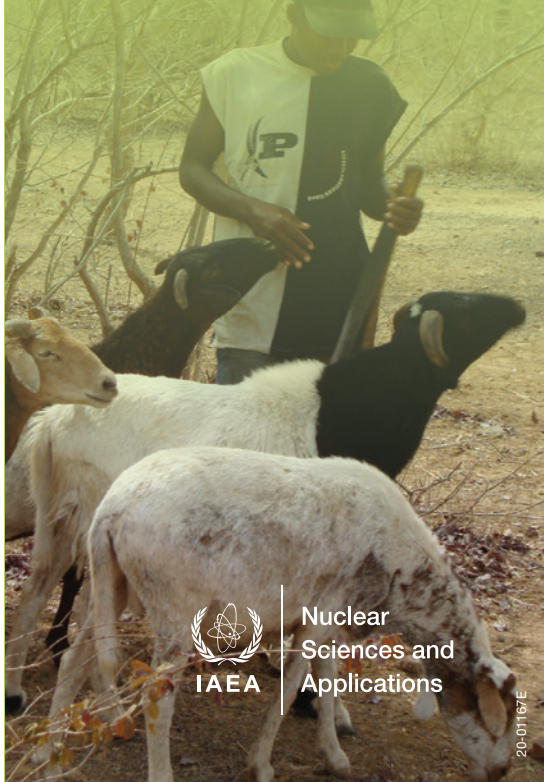
Quality assured detection of the PPR virus and other small ruminant respiratory pathogens will be strengthened. Also, disease diagnostics and surveillance, post vaccination monitoring and confirmation of freedom from disease will be significantly improved. Ultimately, PPR and respiratory disease burden will be reduced in the targeted countries through enhanced surveillance and early detection.

TOTAL ESTIMATED BUDGET

Budget (EUR) with 7% PSC included

Year 1	508 250
Year 2	572 450
Year 3	476 150
Total*	**1 556 850**

*Partial funds already received. Support of estimated €1.05M is required.



IAEA Nuclear Sciences and Applications

20-01167E