IAEA
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PROGRAMME OF COORDINATED RESEARCH ACTIVITIES
Webpage: https://www.iaea.org/services/coordinated-research-activities

PROPOSAL FOR RESEARCH CONTRACT

PLEASE SEND YOUR PROPOSAL FOR RESEARCH CONTRACT TO research.contracts@iaea.org.
ONLY DULY FILLED AND SIGNED PROPOSALS WILL BE PROCESSED.

Research Contracts are generally awarded to institutions in developing countries or countries in transition insofar as they can effectively carry out the research. The template for Proposal for Research Contract is also used for Doctoral Contract and for Technical Contract.

1. CODE OF THE COORDINATED RESEARCH PROJECT (CRP) UNDER WHICH THE RESEARCH CONTRACT SHOULD BE PLACED:
K41024

2. TITLE OF THE COORDINATED RESEARCH PROJECT (CRP) UNDER WHICH THE RESEARCH CONTRACT SHOULD BE PLACED:
Optimizing Nuclear Techniques to Assess Microplastic Pollution in Coastal Areas

3. TITLE OF PROPOSED RESEARCH CONTRACT (should reflect the proposed research work):
Presence of microplastics in marine sediments; quest for new methods

4. CONTRACTING INSTITUTION
(The contracting institution can ONLY be an institution with independent legal personality)

Inst. Name: Technological University of Panama

Street: Avenida Universidad Tecnológica de Panamá,
Vía Puente Centenario,
P.O. Box: 0819-07289, El Dorado, Panamá, República de Panamá
Postal Code: na
City: Panama
Region/District: Panama
Country:
Tel.: 507 560-3000
Fax:
Email: buzondesugerencias@utp.ac.pa

5. IMPLEMENTING INSTITUTION:
(Where the research is performed - can be the contracting institution or a sub-institution, a branch of the main institution or a laboratory)
If not the contracting institute, please provide:

Inst. Name: CIHH - LAB DE MICROPLASTICOS

Street: Via Tocumen
P.O. Box: NA
Postal Code: NA
City: Panama City
Region/District: Tocumen
Country: Panama
Tel.: 507 6327-4125
Fax:
Email: denise.borrero@utp.ac.pa

6. SUMMARY OF PROPOSED RESEARCH:

Our research group is exploring new methods of extraction of microplastics and identification of their components, and propose a combined extraction method for small microplastics.The protocol for sediments is time consuming and complicate for developing countries, we propose an environmentally sound approach.

7. PROJECT PERSONNEL (if space provided below is insufficient, please attach additional sheets)

A. *Chief Scientific Investigator (CSI)*

Family Name:	First Name:	Gender: M/F	Date of birth: yyyy-mm-dd	Nationality:
DELVALLE BORRERO	DENISE MARIE	F	1955-09-01	PAN

Telephone (office):	Fax (office):	Email (office):	Position held:
	NA		RESEARCHER III

Academic degree:	Subject:	Institution:	From:	To:
DR.RER.NAT.	BIOCHEMISTRY	RUPRECHT KARLS HEIDELBERG, GERMANY	1983	1987

Related scientific experience: more than 20 years

Recent publications related to the project (within the past 2-3 years):

2022 Carlos Mazariegos Ortiz, Rebeca Quintanilla, Denise Delvalle-Borrero, Oscar Amaya-Monterrosa, Marvin Xajil-Sabán. Académicos de Centroamérica crean una red de investigación y monitorean la basura marina aplicando la ciencia ciudadana. Ecosistemas, Vol. 31 Núm. 2 (2022): Mayo-Agosto https://doi.org/10.7818/ECOS.2397

2021 Winnie Courtene-Jones, Taylor Maddalen, Molly K. James, Natalie S. Smith, Kathryn Youngblood, Jenna R. Jambeck. Sally Earthrowl, Denise Delvalle-Borrero, Emily Penn, Richard C. Thompson. Source, sea, and sink—A holistic approach to understanding plastic pollution in the Southern Caribbean.Volume797, 25 November 2021, 149098

https://doi.org/10.1016/j.scitotenv.2021.149098

2021Carlos Mazariegos-Ortiz, Marvin Xajil-Sabán, Elisa Blanda, Denise Delvalle-Borrero Ocurrencia de microplásticos en el tracto digestivo de peces de la Reserva Natural de Usos Múltiples Monterrico, Guatemala.Revista Ecosistemas. https://doi.org/10.7818/ECOS.2188

2020 Denise Delvalle de Borrero, José Fábrega, Jorge Olmos, Ostin Garcés-Ordóñez, Distribution of plastic debris in the Pacific and Caribbean beaches of Panama. Air, Soil and Water Research, DOI: 10.1177 / 1178622120920268. SAGE, United Kingdom http://journals.sagepub.com

% of total working time devoted to the project: 25

B. *Secondary CSI (if applicable)*

Family Name:	First Name:	Gender: M/F	Date of birth: yyyy-mm-dd	Nationality:
NA	NA	NA		NA

Telephone (office):	Fax (office):	Email (office):	Position held:

Academic degree:	Subject:	Institution:	From:	To:
-	-	-	-	-
-	-	-	-	-

Related scientific experience: na

% of total working time devoted to the project:

C. *Main additional Scientific Staff*

Family Name:	First Name:	Gender: M/F	Date of birth: yyyy-mm-dd	Nationality:
ESPINOSA	ALMA	F	1982-04-22	Panamanian

Telephone (office):	Fax (office):	Email (office):	Position held:
		alma.espinosa@utp.ac.pa	Special researcher

Academic degree:	Subject:	Institution:	From:	To:
BSc	Chemistry	University of Panama	2000	2007
MSc	Chemistry	University of Panama	2017	2019

Related scientific experience: 14 years as technician, 5 as researcher
% of total working time devoted to the project: 15

D. Main additional Scientific Staff

Family Name:	First Name:	Gender: M/F	Date of birth: yyyy-mm-dd	Nationality:
LLOYD	JAVIER	M	1988-03-30	panamanian

Telephone (office):	Fax (office):	Email (office):	Position held:
		javier.lloyd@utp.ac.pa	technician and young researcher

Academic degree:	Subject:	Institution:	From:	To:
BSc	Chemistry	University of Panama	2004	2010
MSc	Analytical Chemistry (ongoing studies)	University of Panama	2022	.....

Related scientific experience:
% of total working time devoted to the project: 20

8. **PROPOSED RESEARCH PROJECT (if space provided below is insufficient, please attach additional sheets)**

A. Scientific Background

Despite global concerns, plastic products represent 80% of marine litter found in survey studies around the world (UNEP, 2016), considering the magnitude and the spread of plastic contamination, some authors refer to the current period as the plasticene (Boucher and Friot, 2017; Reed, 2015). Accumulations of plastic waste can be found along the coastline because of wind, ocean currents, river outflows and through direct littering of beach visitors. Plastics released in the environment, are exposed to harsh conditions: UV radiation, high temperatures, physical impact, erosion, resulting in brittleness and breakage into smaller pieces. Ocean has been serving as a sink for decades. Many studies have addressed mechanisms for transportation and distribution of small microplastics in sea water: biofouling, biofilm formation, aggregation, ingestion and feces disposal being the main reasons for sedimentation of plastics and its presence in organic matter.

B. Scientific Scope of the Project (Scientific problems to be addressed with overall and specific objectives)

Small plastic pieces can be ingested by living organisms along the food web becoming a possible risk to human health. The overall objective of the proposal is to review and modify a protocol for extraction of MPs from marine sediments. The proposed methodologies for isolation of small microplastics, are complex, not always environmentally sound and time consuming. Our Lab is searching for new methodology to facilitate the extraction from the sediment.Therefore our specific objectives are:
-Propose and validate a new isolation methodology
-Improve the mapping technique with micro FTIR using the transmission mode
-Propose a standard procedure to facilitate the assessment of marine plastic pollution in marine sediments

C. Overall programme of work for the whole duration of the Contract, including proposed methods or techniques

First Year: Worldwide literature search on MPs and marine sediments, purchases, training of students, Leak proving the current protocol and making the necessary adjustments. Preliminary tests with enzymatic solutions, testing and adjusting concentrations.
Second year: Alliances with national institutions for logistics. Collection of samples in different points of Panamanian sea floor validation of the methodology, dissemination of results, publication of results.

D. Detailed programme of work for the coming year (used as reference for the annual Progress Report)

The first year of the project will include the purchase of necessary equipment, the laminar flow chamber

will avoid laboratory environmental cross contamination, convection oven is needed for an efficient drying process of samples, the orbital shaker is necessary for adequate enzymatic reactions.
The second year will be dedicated to alliances on logistic arrangements, sample collection, sample treatment and concentration in sediments (No of items/ weight) and characterization of the plastic particles,

E. Expected Outputs

As an output is expected to find the enzyme concentration correlated to the amount of organic matter to be digested.Scientific publication on results, a written procedure and dissemination of the SOP

9. RELATED WORK ALREADY PERFORMED OR IN PROGRESS AT INSTITUTE (including work performed in connection with the IAEA through Technical Cooperation projects):

The Microplastics Laboratory was established in 2017 with a grant of the National Secretary for Science and Technology (FID16-044" Analytical determination of MP in sandy sediments and sewage water"), between 2017 and 2020 financed by the National Secretariat for Science and Technology. Amount: 100,000.00 USD.We have been collaborating with national institutions like ARAP in the Arcal project RLA7020 as responsible person for the national microplastic component. We received small equipment. I was member of REMARCO executive Committee for more than two years during Arcal RLA7025 where we received field equipment and the generous donation of a microscope FTIR-ATR.
We are currently working in various projects involving different matrixes: for example a collaboration project with Brazil (Bivalves project), national marine debris inventories (MiAmbiente), microplastics in waste water and sludge from the WWTP Juan Diaz (own funds) and a recent grant for determination of Persistent Organic Pollutants adhered to microplastics (Grant FID22-089; 100,000.- USD). I´m also DTM for the IAEA project RLA 1020.

10. FACILITIES and EQUIPMENT

A. Please list facilities (building, equipment - including type and name of manufacturer, and materials) presently available which would be used for the project:

Our current facilities consists of 36 sqm Laboratory plus 12 sqm office, but we collaborate with other laboratories located on the same campus. Our equipment: Microscope FTIR-ATR Bruker, B-KIMW spectral library, Leyca Si9 Macroscope, UV fluorescent lamp Crimelite, Zeiss Primovert invert microscope, 2 OHaus Scales semi analytical, vacuum pumps, filtration systems, oven and other small equipment

B. Equipment needed for the project which is not available under 10.A.:

Items	Estimated project costs in €		
	To be provided by the institution	To be provided by Other (non-IAEA)	Requested contribution from the IAEA
1. LAMINAR FLOW CHAMBER-5 FEET	NO	NO	15,000.-
2. CONVECTION OVEN	NO	NO	10,000.-
3. ORBITAL SHAKER for at least 9 flasks	NO	NO	5,000.-
4. Reagents, accessories and maintenace for the FTIR microscope for one year	NO	NO	10,000.-
Sub-total:			40,000.-

If equipment contribution from the IAEA is requested,

a) will this equipment be purchased by the institute, using the cash award? ☐ OR

b) shall the IAEA purchase the requested equipment on behalf of the institute? ☒

Please specify: Option A because of the warranties and local maintenance

11. BUDGET ESTIMATE of the project by year (please show all amounts in EUR €)

Project Year	1. Staff Costs	2. Equipment	3. Miscellaneous *	Project Total (= 1+2+3) or (= 4+5+6)	4. Contribution by Institute	5. Contribution by Other (non-IAEA)	6. Requested contribution from the IAEA
1st	60,000	40,000	2,500	102,500.-	62,500.-	0,0	40,000
2nd	60,000	0,0	2,500	62,500	62,500.-	0,0	0,0
3rd	-	-	-	-	-	-	-
4th							
5th							
6th							
Total	120,000.-	40,000	5,000	165,000.-	125,000.-	0,0	40,000.-

*If 'Miscellaneous' costs are entered in the table, please elaborate here: Field trips plus related costs

NB.: Travel cost to Research Coordination Meetings (RCMs) should not be included in the Budget Estimate.

12. PROPOSED PROJECT COMMENCEMENT DATE:

June 2023

13. ADDITIONNAL INFORMATION (if required):

We are now performing preliminary enzymatic tests with promising results

14. SIGNATURES

CHIEF SCIENTIFIC INVESTIGATOR:

(Signature)

Denise Delvalle Borrero PhD
(Name and Title)

Panama March 31, 2023
(Place and Date)

HEAD OF INSTITUTE:

(Signature)

Dra. Angela Laguna
(Name and Title)

Panama. March 31, 2023
(Place and Date)