

# GEODES

Geosciences, Development and Sustainability



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## D1.2 Stakeholders surveys

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## **ABSTRACT**

The present report presents results from the surveys of stakeholders mentioning needs and how they must be addressed in the context of the GEODES project.

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## **INTRODUCTION**

This document aims to show a summary of identified needs that can be addressed with GEODES project based on the information transmitted by stakeholders. GEODES stakeholders can be organized at 4 levels

- European Higher Education Institutions (HEI) that have created previous consortiums aiming at capacity building in developing countries;
- HEI in Angola and Mozambique with a history of several decades in the field of geosciences;
- New-comers HEI from Angola and Mozambique;
- Third parties.

A questionnaire focused on the needs already identified and how they must be addressed in the context of the project was delineated during the Kick-off Meeting held in Coimbra on 25-26 September. A final document was delivered to the participants (all HEI) during the subsequent week. Only stakeholders of the first 3 levels were asked to fill the questionnaire. Their answers and supported the part dedicated to third-parties.

## **NEWCOMERS FROM ANGOLA AND MOZAMBIQUE**

Project GEODES welcomes 4 HEI where training in the field of geosciences is relatively recent and have enormous potential for regional growth. Two from Angola: University Katiavala Bwila (UKB) and University Mandume ya Ndemufayo (UMN); and two from Mozambique: University of Lúrio (UL) and University Púngué (UP). The main beneficiaries of GEODES belong to this group of stakeholders.

Previous contacts reveal that the needs in terms of infrastructures, materials and staff in these institutions are huge and GEODES cannot overcome all them. The questions for these partners were created having this in mind. Team members from these institutions tried to give reasonable answers taking into consideration the available budgets for their institutions.

Results of the questioners for this group of partners are summarized in Table 1. All HEI expresses the interest in the acquisition of equipment that is important for the formation in geosciences. One also mentioned bibliographic material and the necessity of support in the preparation of didactic laboratory. Two institutions are interested in the reformulation of bachelor course and one in the creation of bachelor and master courses. Formation topics, both to be given face-to-face and online are vast and those who indicate hours of training express interest in long training periods. Two HEIs demonstrated interest in formation for teachers/technicians/researchers while the other two also included students. The presence of students implies substantially more interested in the training activities.

**Table 1: Answers provided by the newcomers from Angola and Mozambique**

WP	Needs	UKB	UMN	UL	UP
2	Equipment and other materials	<ul style="list-style-type: none"> <li>- Analog expandability comparator</li> <li>- Triplice mechanical scale</li> <li>- ISHP type thickening press</li> </ul>	<ul style="list-style-type: none"> <li>- Theodolites</li> <li>- Tower PCs</li> <li>- Bibliographic collections</li> </ul>	<ul style="list-style-type: none"> <li>- Cyclic triaxial testing</li> <li>- Direct shear test</li> <li>- Petrographic microscope</li> <li>- Gold metal detector</li> <li>- Portable X-ray fluorescence spectrometer</li> </ul>	<ul style="list-style-type: none"> <li>- Water multiparameter</li> <li>- Plotter (HD DesignJet PS800)</li> <li>- Drone (Marvic Pro)</li> <li>- GPS Garmin 62SC</li> </ul>
2	Infrastructures	Not for GEODES	Laboratory of mineralogy/petrography	Not for GEODES	Not for GEODES
3	Bachelor courses to be updated	Not for GEODES	<ul style="list-style-type: none"> <li>- Mining Engineering</li> <li>- Geological Sciences</li> </ul>	Not for GEODES	<ul style="list-style-type: none"> <li>- Geology (geoconservation and geological heritage)</li> <li>- Environmental management</li> </ul>
3	Courses to be created	Not for GEODES	Not for GEODES	Not for GEODES	<ul style="list-style-type: none"> <li>- Bachelor in Land Planning</li> <li>- Master in Geosciences</li> </ul>
4	Topics of formation in Africa	<ul style="list-style-type: none"> <li>- Laboratory practices;</li> <li>- Charging and soil analysis.</li> <li>- Use of Schmidt's hammer and- water multiparameter;</li> <li>- Information about open pit exploration practices;</li> </ul>	<ul style="list-style-type: none"> <li>- Mineral Exploration;</li> <li>- Petrology, geochemistry, isotope geochemistry</li> <li>-Seismic, gravimetric and magnetic properties;</li> <li>- Renewable energy;</li> <li>- Soil mechanics;</li> </ul>	<ul style="list-style-type: none"> <li>- Classification and evaluation of mineral deposits;</li> <li>- Drilling and rock mining;</li> <li>- Isotope geochemistry; -</li> <li>- Magmatic a metamorphic petrology;</li> <li>- Hydrological hazards;</li> </ul>	<ul style="list-style-type: none"> <li>- Sedimentology</li> <li>- Mineralogy</li> <li>- Seismic and petrophysics</li> <li>- Water chemistry</li> <li>- Geostatistics and data analysis</li> </ul>

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		<ul style="list-style-type: none"> <li>- Landslides prevention;</li> <li>- Groundwater preservation;</li> <li>-Containment of the occupation of slopes.</li> <li>- Global Changes.</li> <li>- Training in landfills management</li> </ul>	<ul style="list-style-type: none"> <li>- Software specific of geology and mining</li> </ul>	<ul style="list-style-type: none"> <li>- Characterization of rock massif;</li> <li>- New techniques in exploration, mining and environmental restoration;</li> <li>- Depositional systems;</li> <li>- Characterization and modeling of petroleum systems;</li> <li>- Geostatistics (e.g., kriging);</li> <li>- Remote sensing in geosciences;</li> <li>- Exploration of groundwater, oil and gas</li> <li>- Soil mechanics;</li> <li>- Environmental impact of mining</li> </ul>	
4	Hours of formation in Africa (by typology)	Trainer's discretion	Theoretical: 120 hours Practical: 180 hours Field: 180 hours Others: 60	Trainer's discretion	Theoretical: 200 hours Practical: 300 hours Field: 80 hours
4	Nº interested (teacher/ technician/ student)	Teacher: 4	Teacher: 4 Technician: 1 Student: 40	Student:4	Teacher: 29 Technician: 3 Student: 70
5	Topics of on-line formation	Several in the fields of: <ul style="list-style-type: none"> <li>- Topography.</li> <li>- Geological Resources</li> <li>- Soil Mechanics</li> <li>- Geophysical Prospecting</li> </ul>	<ul style="list-style-type: none"> <li>- Management of mineral and energy resources;</li> <li>-Aquifer management;</li> <li>- Soil recover in mining areas;</li> </ul>	As for "Topics of formation in Africa"	<ul style="list-style-type: none"> <li>- Water chemistry</li> <li>- Geostatistics and data analysis</li> <li>- GIS</li> </ul>



Stakeholders Surveys

		- Rock Mechanics - Slope Stability	- Mitigation of natural geological disasters; - Software specific to Geology and Mining areas		- Mapping and geological hazards
5	Hours of formation in Africa (by typology)	Trainer's discretion	Theoretical: 120 hours TP: 180 hours Other: 60	Trainer's discretion	Trainer's discretion
6	Nº internship (teacher/ technician/ student)	4	Teacher: 4 Technician: 1 Student: 40	5-10	Teacher: at least 4 Student: at least 10
6	Field/economic area		Exploration of ornamental rocks, gold and iron		Mining, Geotourism, consulting
7	Nº interested research calls	3	2 (teachers) +2 (students)		6 (including 2 for PhD applications)

## WELL ESTABLISHED HEI FROM ANGOLA AND MOZAMBIQUE

This group of stakeholders consists of institutions from Angola and Mozambique with a history of several decades in the field of geosciences and very significant level of facilities/equipment and graduated teaching teams. They are University Agostinho Neto (UAN) and University Eduardo Mondlane (UEM). These HEI are clearly the most important in the two countries. Table 2 shows a synthesis of the received answers.

**Table 2: Answers provided by the well-established HEI from Angola and Mozambique**

WP	Needs/offers	UAN	UEM
2	Needs in terms of equipment		Rings mill Computers Internet server
2	Needs in terms of infrastructures		Not for GEODES
4	Topics of formation offered		Geophysical data processing for aquifer assessment Interpretation of XRD, XRF and AAS data Structural analysis of crystalline basement Processing satellite images for groundwater and geological research Principles of classification and analysis of sedimentary, igneous and metamorphic rocks
4	Hours of formation (by typology)		Theoretical: 120 hours Practical: 200 hours Field: 200 hours Others (lab): 200 hours
6	Nº internship (teacher/ technician/ student)		Teacher: 5 Technician (researcher): 3 Student (master): 10

## BENEFICIARIES FROM EUROPEAN COUNTRIES

The European beneficiaries of GEODES project are University of Coimbra (UC), University of Salamanca (USAL) and University of Turin (UNITO). These stakeholders have participated in previous consortiums aiming at capacity building in developing countries.

The surveys prepared for these stakeholders focused on WP5 (On-Line Training) and WP7 (Research Training & Proposals Preparation). However, they are available to give face-to-face formation upon request or participate on-line in hybrid session hosted in UAN or UEM in the frame of WP4. Teaching topics offered by European HEI, having in mind needs expressed by newcomers from Africa, are listed in Table 3.

**Table 3: Summary of topics of on-line formation offered by the European HEI**

WP	HEI	Topics of on-line formation offered	Hours
5	UC	<ul style="list-style-type: none"> <li>- Remote sensing</li> <li>- Petrography, mineralogy and geochemistry</li> <li>- Isotope geochemistry and geochronology</li> <li>- Applied geophysics</li> <li>- Thematic cartography</li> <li>- Mineral exploration</li> <li>- Mineral processing</li> <li>- Environmental assessment and restoration</li> <li>- Natural hazards</li> <li>- Hydrogeology (physical and chemical processes)</li> <li>- Soil and rock mechanics and stability</li> <li>- Preservation of natural and constructed heritage</li> </ul>	
5	USAL	<ul style="list-style-type: none"> <li>- Structural geology</li> <li>- Geological mapping</li> <li>- Tectonics</li> <li>- Geophysics</li> <li>- Applied Mineralogy</li> <li>- Analytical techniques applied to mineralogy</li> <li>- Mineral deposits</li> <li>- Soil mechanics with the help of Geotechnical software</li> <li>- Sampling techniques: from the field to the laboratory</li> <li>- Geochemistry</li> <li>- Applied geochemistry: environment and prospecting</li> <li>- Geostatistics</li> <li>- Geological and cultural heritage</li> </ul>	2 2 2 2T+1P 2 2 2T+2P 3T+2P 3T+2P 2 2 2T+1P 2T+1P
5	UNITO	<ul style="list-style-type: none"> <li>- Introduction to groundwater; role and importance</li> <li>- Classification of rocks depending on the typology and degree of permeability</li> </ul>	2T 2T

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	- Groundwater mapping	2T
	- Groundwater in a climate change scenario	2T
	- Analysis of groundwater historical series with excel	2P
	- Groundwater and Sustainable Development Goals	2T
	- Circular economy in extractive industry	6T
	- Mining impacts and risk analysis	6T
	- GIS, GEOMATICS and UAV-DRONE survey	
	- Cultural heritage and stones	6T
	- Mineral processing and ornamental stones working activities	4T
	- Good practices for characterization of bimunits and complex formations	2T
	- Advanced techniques for physico-mechanical characterization of rocks for civil and mining uses	2T
	- Challenges in the excavation in sulphate rocks	2T

T: theoretical, P: practical

Regarding WP7, the questionnaire included possible research calls for which team members of UKB, UMN, UL and UP could apply. However, as the task will begin only in M18 of GEODES, it was considered that the reply could not be assertive at this time. However, regular meetings to prepare WP7 are already being arranged.

## THIRD PARTIES

Third parties are other institutions and private companies that are not beneficiaries of GEODES and were not listed as Associated Partners, but should be involved to achieve the objectives of the project. In particular, in the work package aiming at the development of internships in Angola and Mozambique (WP6).

After the submission of GEODES application, contacts with third-parties have been maintained. Below is a provisional list of companies/institutions where internships for professional training can take place (Table 4). All areas of interest indicated by the GEODES beneficiaries are covered in this list.

**Table 4. List of institutions where internships can take place**

Country	Company	Geosciences national relevance	Main activity area
ANG	MARLIN	Local	Min. Resourc.
ANG	GRANISUL	Local	Min. Resourc.
ANG	METARROCHA	Local	Min. Resourc.
ANG	PLANASUL	Local	Min. Resourc.
ANG	ANGOSTONE	Local	Min. Resourc.
ANG	RODANG	Local	Min. Resourc.
ANG	ENDIAMA	Major	Min. Resourc.
ANG	CATOCA	Major	Min. Resourc.
ANG	IGEO (Instituto Geológico de Angola)	Major	Geosciences
ANG	SONANGOL	Major	Energy
ANG	MIREMPET (Min. Rec. Minerais Petróleo e Gás)	Major	Geosciences
ANG	ANGOLACA	Moderate	Infrastructures
ANG	HIPERMAQUINAS	Moderate	Equipment
ANG	OMATAPALO	Moderate	Infrastructures
ANG	IMOSUL	Moderate	Infrastructures
ANG	METALOSUL	Moderate	Infrastructures
MOZ	RUBY (Montepuez Ruby Mining Limitada)	Major	Min. Resourc.
MOZ	GRAFEX	Major	Min. Resourc.
MOZ	SYRAH	Major	Min. Resourc.
MOZ	GK ANCUABE	Major	Min. Resourc.
MOZ	TWIGG EXPLORATION	Major	Min. Resourc.
MOZ	KENMARE RESOURCES	Major	Min. Resourc.
MOZ	JINDAL	Major	Energy

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MOZ	ICVL	Moderate	Min. Resourc.
MOZ	Mota-Engil	Moderate	Infrastructures
MOZ	FIPAG	Moderate	Water
MOZ	ARA (Administração Regional de Águas)	Moderate	Water
MOZ	INGD (Inst. Nac. Gestão e. Redução do Risco de Desastres - INGD)	Moderate	Hazards
MOZ	ECM (Eng. Consultores de Moçambique, S.A.)	Moderate	Infrastructures
MOZ	CONSULTEC	Moderate	Infrastructures

## **Integrated summary**

The tasks involving the acquisition of equipment may face difficulties due to financial and commercial specificities in Angola and Mozambique. The experience from other projects and the active involvement of the task coordinators will be crucial for the acquisition of the material goods identified in the survey.

In what regards teaching/training of geosciences subjects, the survey demonstrated good perspectives of compatibilization between the needs expressed by the four newcomers and the offers from European HEIs and the most important HEIs of Angolan and Mozambican. Adjustments in terms of hours of formation and number of attendants coming from each institution should be required.

GEODES partners identified a very significant number of companies/national institutions from distinct domains of economic activity. Contacts with these stakeholders are being conducted and should be possible to ensure the internships considered in the GEODES application.

Partners have a clear understanding of what is intended with the tasks involving preparation of research proposals for competitive financing and the provisional number of interested people is adequate.