

GEOCULTURE AND GEOSCIENCES IN THE REGION OF ANALAMANGA IN MADAGASCAR

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ABSTRACT

Many names of localities in Madagascar recall the words "stone or rock" whose meaning in Malagasy is "vato" (Vatomandry, Ambatobe, Ambatolampy, Ambatomainty, Ambatonilita, Ambatofinandrahana, Ambatondradama, Ambatomitsangana ..) These names are evocative and / or related to an event.

In his speeches, his proverbs, his habits and customs, his beliefs the malagasy have often referred to the "vato" ("Vato nasondrotry ny tany", "Vato namelan-kafatra", "Nitady toko ka sendra vato", "Vato kiboribory", "Vatolahy", " Ambato bevohoka "..).

From these facts and observations that we want to emit in this communication, the concept "Geoculture", the link and the meaning of this culture on stones or rocks with the geosciences.

But in Madagascar this culture on stones or rocks change according to ethnicity, regions, events or circumstances and history.

Keywords: *geoscience, culture, worship, vato, doany, geoculture, Analamanga, Madagascar.*

1. INTRODUCTION

Since his appearance towards 3 million years, the man has been able to tame the surrounding nature and environment. The caves served as a refuge or shelter while the rollers and the rocks were used as tools of defense and hunting.

In contemporary civilization, the world's cultural richness has been expressed through the art of building (Pyramid of Egypt, the "moai", the monumental statues of Easter Island in Polynesia, the Mayan culture with its ability to build huge works using rudimentary technics ...).

From the material of survival, the stones became objects crowned for certain ancestral beliefs, to the materials of construction, of decoration, ornamentation and even of therapeutic objects.

In Madagascar, our ancestors were famous for their sense of observation, their respect for the environment and nature. They referred to this biotic world (living) and abiotic (not living like stones) that surround it to express themselves by creating and imagining word games in their speech many of which evoke the words stones or rocks (vato).

Linking geological knowledge with traditional Malagasy culture based on contemplation and observation of the natural environment, allows us to define a new concept that is "geoculture".

In the Central Highlands of Madagascar, especially in the region of Analamanga, the stones occupied an important place in the daily life of the population, in their belief and for the ancestors worship. The places of these cults deserve to be valued in "geosites".

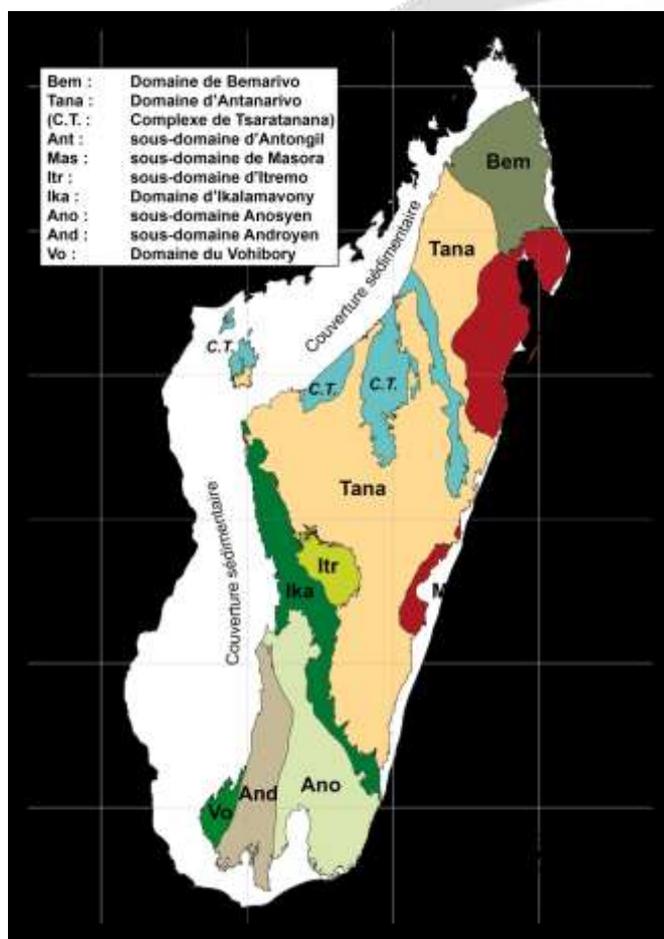
2. METHODOLOGY

Generally the methodology is based on observations and bibliographic research.

2.1- Framework of study

The geological history of Madagascar is summarized by a succession of events: cratonization (Dharwar craton), fragmentation and insularization. The island is made up of two distinct geological formations: the crystalline basement in the east and the sedimentary formation in the west.

The Precambrian basement occupying two-thirds of the island is divided into six areas according to recent work [1] (Fig- 1). It has an Archean frame consisting essentially of tonalitic gneisses and granite orthogneisses. These are the oldest known rocks in Madagascar forming the Malagasy shield defined as being the domain of Antogil-Masora. The extensive range of Antananarivo consists of orthogneiss and Neoproterozoic paragneisses in green to granulitic facies facies [1]. The Analamanga Region, part of this area of Antananarivo, is composed of gneissic and migmatitic formations intersected by many intrusions and granitic veins.



The six domains of the Malagasy Precambrian basement:

- In the North, the Bemarivo domain;
- To the east, the Antongil - Masora domain, subdivided into two sub - domains;
- At the Center, the Antananarivo domain;
- In the West the Ikalamavony domain;
- In the South the domain of Androyen - Anosyen, subdivided into two subdomains

Fig-1: The six domains constituting the framework of the Malagasy Precambrian basement.

Fig- 2 showing the different geological formations around Antananarivo and Manjakandriana [2] are included in the Analamanga Region. From this map, it appears that the area is very rich in rock materials, which confirms the saying of Rajemisa Raolison [3] "Tany bevato i Madagasikara" (Madagascar is full of stones or rocks). Due to its island position and its tectonically unstable geologically, Madagascar has a large geodiversity that can be valued in "geosite".

2.2- Concept of geosites [4]

The concept of "geosite" was introduced by UNESCO and defined it as: «A punctual site or an area of a few square meters to a few square kilometers that can extend at the level of the landscape and which has an important a geological point of view (mineral, structural, ..) geomorphological, physiographic, etc. which meets one or more exceptional criteria, whether precious, rare, vulnerable or threatened».

These are sites of scientific interest, particularly geological and geomorphological, offering landscapes of scientific, cultural and aesthetic value.

Geosites are so many riches that can be classified as World Heritage.

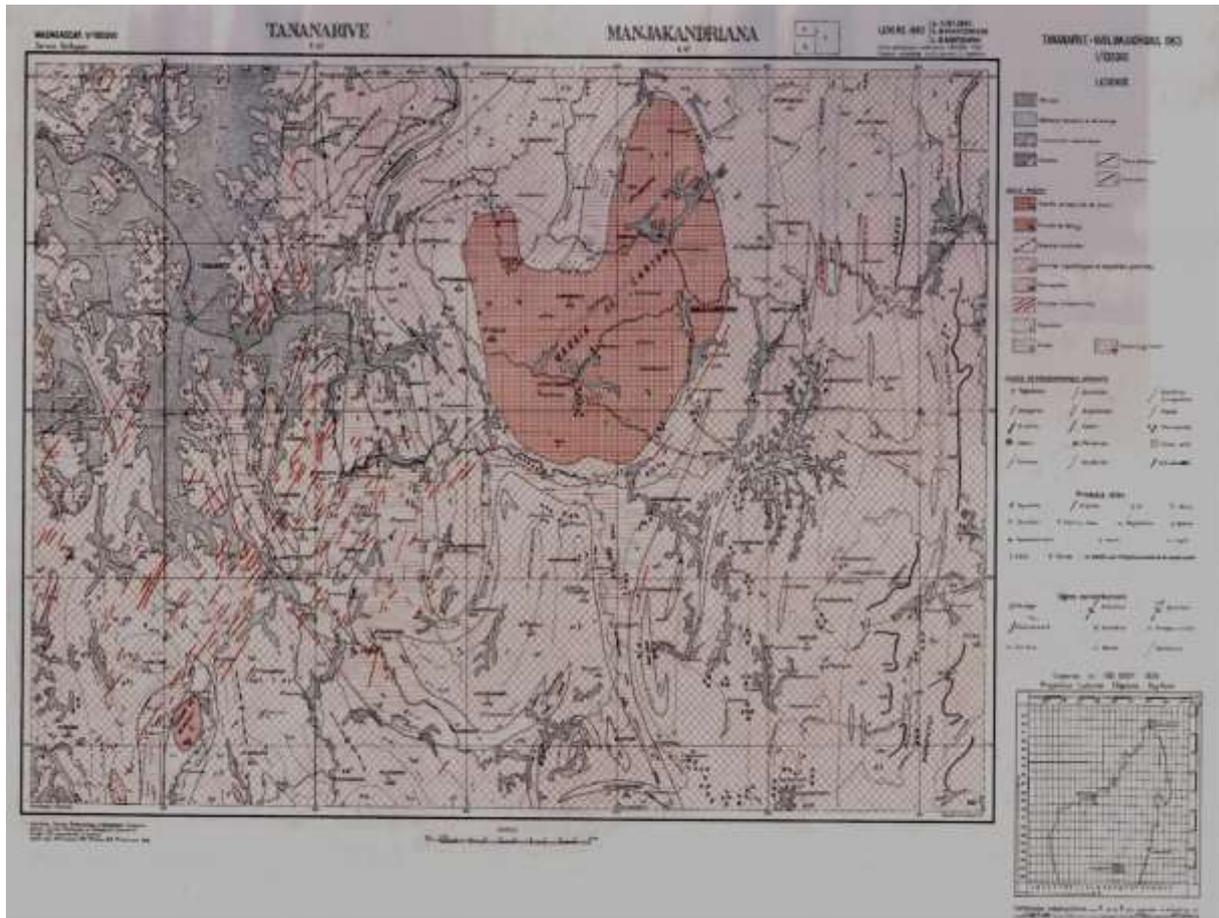


Fig-2: Geological formations around Antananarivo and Manjakandriana

Fig-3 shows some examples of Madagascar: the ruiniform massif of Isalo (3a), the Tsingy or Lapiez of Bemahara (3b), the crater lake of Tritriva (3c)



Ruiniform massif of Isalo (3a) Lapiez of Bemahara (3b) Crater lake of Tritriva (3c)

Fig-3: Some geosites in Madagascar

2.3- Beliefs and religious life

The traditional Malagasy civilization proper to religious life is based on the belief in "Zanahary" or "Andriananahary" which designated divine beings. The primitive religion was built around the belief in the immortal soul that separates from the body to the death of man, becoming "sacred". The ancient funerary cults celebrated the separation of the sacred dead from the world of the living. The ancient societies of Madagascar thus venerated their dead who according to the regions were considered as "gods" and "spirits" water, stones and forests, spirits that can haunt and possess living beings. Some people also believe that souls dwell in specific places (for example, in high mountains like Ambondrombe, in the waters, in the forests and in the caves) These places become sacred and are surrounded by taboos, hence the name "tany ady". "These are the places that turn into" Doany. "Our ancestors respected the space they considered sacred.

This civilization has evolved, especially with regard to the role of Zanahary through the creature (human being) and nature (water, stone, relief, forest ..). In this logic the traditional Malagasy lived in a universe that connects the living and the dead. Death is an unavoidable step to access the status of ancestor, a symbol of spiritual power. The Malagasy Ancestors, long before the entry of christianism, had their beliefs, they believed in "supernatural forces" superior to them and that can be beneficial or evil in relation to the acts and behaviors of each one.

3. RESULTS

3.1 The place and role of stones in everyday life and traditional Malagasy society [5]

3.1.1 Stone as building materials and protection of the village

In the entrance of the villages of Highlands Central are always observed of "Hadivory" (ditches of defense). In addition to these ditches that surrounded the village, there is the presence of the "Kodiavato" (portal stone disc, Fig- 4).



Fig- 4: The stones used as gate for an old village in the Central Highlands of Madagascar

3.1.2 The stone marks power and territory

A sovereign who ascended the throne should ascend to the "Vatomasina" (sacred stone) to deliver his speech. This action meant to the people that the sovereign had full power, that all the land belonged to him and that the people must obey him.

In some localities, other than in the vicinity of the Analamanga Region, the raised stones "Vatolahy" also mark the territory of a kingdom. It can also symbolize other situations such as the commemoration of events or people, the witness of an act of solidarity of the population.

3.1.3 The stone in the names of localities

Many place names carry the word "vato" and have a value or meaning depending on the color, quality or characters of the stone or rock.

Examples:

- Ambatofotsy (white stone) Ambatomena (red stone), Ambatomanga (blue stone), Ambatomainty (black stone);
- Ambatotrahana: place showing rocks with natural holes;
- Ambatondradama (Radama stone): name of locality located in the North West of Ambohimanga. It is a place where Radama played during his childhood and became sacred (doany);
- Ambatomasina (sacred stone) located east of Andohalo, northwest of Ambohitantely. Our ancestors think that this rock shelters vazimba so they sanctify it;
- Ambatomisatroka a hat-shaped rock on the road to Andramasina;
- Ambatomiantendro: (in Ambohimanga) it is the summit of the great rock south of Ambohimanga and southeast of the palace. According to its name, it is the rock at the top of the village;
- Ambatomitsangana: where there is a rock shaped elongated and placed as a pillar. This rock is a symbol of memory of someone with an important history;
- Ambatobevohoka (pregnant stone) is to evoke a project or an unrealized or unfulfilled promise.

3.1.4 The stone in proverbs and sayings

The elders are known for their wisdom and knowledge based on the observation of the environment. These two characters were manifested in part by oratorical forms called "Kabary" which consists in making puns by using word game or example. They are figures of styles used during a speech.

Many proverbs evoke the word stone "Vato". Here are some examples:

- "Izay mitambatra vato, izay misaraka fasika" (Literally: those who unite are like the rock and those who separate are like sands);
- "Vato ambany riana: tsy mikorontana fa mifanamboatra toerana" or "Vato an-dava-drano: tsy miady fa mifanajary toerana" (Literally: Rocks under a waterfall: they are not in confusion but are amalgamating with each other);
- "Mandry ivohon'ny vato" (Literally: sleeping on stone)
- "Vato namelan-kafatra" (literally: stone where one left the messages).
- "Ny tanora vato mandondona, ny antitra hazo amoron-tevana, ka tsy hita izay hianjera aloha." (Literally: The young man is like a stone overhanging and the old man like a tree on the edge of the precipice: we do not know which one of the two will fall first).
- "Aza mitaitay ny ho sola, fa vato no hololohavina" (Literally: Do not be afraid to be bald while carrying stones on your head);
- "Mitari-bato tsy mihoraka: very ny androatokon 'aina" (Literally: Shooting a big block without screaming makes you lose half of your energy).
- "Ny vato menatra ny vato, ny hazo menatra ny hazo" (Literally: A rock is ashamed of a rock and the tree of a tree).
- "Vato an-tanimbary ka na tsy voan'ny antsy fararano aza, ho tratra ny angady lohataona" (Literally: A stone in the rice field: if the sickle of the harvest saves it in autumn, the spade will take care of it at spring).
- "Aza atao fihavanam-bato: raha tapaka tsy azo atohy; fa ataovy fihavanan-dandy: raha madilana, azo tohizana" (Literally: That friendship is unlike that of stone, once broken, it does not mend anymore but rather to that of silk threads because if they are too much we can always strengthen them).

3.1.5 The stone in the games

In traditional society, the "*Tanisa*", a game that involves juggling at least two stones is for boys while the "*Tsobato*" a game that consists of knowing how to juggle five small stones at least in order to accumulate points is exclusively for the girls. The stone was really linked to the Malagasy civilization. This is visible in many situations in the daily lives of our ancestors. The old Malagasy gave an important place to the different elements of their nature and their environment. This importance is proved by the idea of *Manan-jina* or *Misy Tsininy* (who are sacred). Many places across the Big Island, for example, have their taboos that should not and should in no way be desecrated or transgressed. Malagasy knew perfectly associate the "Materials" of their entourage with the cults and the needs necessary to the dailies. Preventing attacks and aggression from outside and protecting the people, ditches and walls with gates were built with stone discs; stones were erected in village foundations, markings of territory or in children's games. We can thus conclude that the stone was used almost in all facets of

the daily life of the ancients. Certainly, the stone was really linked to our civilization by its presence in the daily life of the Malagasy yesterday. However, there were still limits because it was linked to a prohibition.

3.2 Doany and offerings [6]

"Ny vato aza raha nahitana soa hosora-menaka", is said of a kind of Malagasy culture that is worship on the rocks. These cults will be held in sacred places that are usually rocks or in caves where people ask what they want and make promises (fig-5). If their demands come true; they will fulfill their promises and bring offerings. Here, these are considered "oil". These sacred places have ties to Malagasy royal stories and many people think that the souls of these Kings are still roaming these places commonly called "Doany". For example: The place where the soul of Randriamitety lives is called "Doany de Randriamitety" (it is in a cave on the southern slope of Andringitra).



5a Rock as a ball



5b Randriamitety cave

Fig- 5: Places of offerings

4. DISCUSSIONS

4.1 Significances and scientific explanations of these sacred places

Most "Doany" in the study area are located on a hill and made up by rocks and / or water around which are some vegetation such as *Afromomunanguistifolium* (longoza), banana, nonoka (a species even family as the *Ficus*), *Ambora*, vahy, *Nonoka*, *Dracaena radradaka* sp, *Kalanchoesp*, *Lantana camara*, This water comes from the fracture sheet.

The dominant geological formations in the central part of the island are granitoid migmatites and granitic intrusions. These formations are massive rocks traversed by fractures or cracks (Fig-7). Fractures cut out granitic (or migmatitic) rock into angular blocks and can be used for entrance (Fig-6). The edges of these angular blocks are dulled and the granite massif debits into "balls".



Figure 6: Raketamanga cave entrance



Figure 7: Fractured rock with a pond

Fig-8 illustrates the different stages and components of the granitic massif disintegration.

- At the base is distinguished the intact solid rock without any deformation;
 - Then occur fractures that cut out the granitic rock into blocks and thus constituting the fracture sheet;
 - These fractured rocks are surmounted by angular blocks which finish by the shape in ball;
 - The granite becomes more and more rotten but the original structure is still preserved to constitute a loose mass called "Isalterite or granitic Arena" On the level of this granitic arena we can meet the arena tablecloth;
 - The alteration becomes much more extensive and the original structure of the granite (bed rock) is completely erased, the loose material thus formed is called "alloterite" which is often surmounted or not by a cuirass.
- The leaching of loose materials into the interstice of the blocks by runoff leaving an empty space and thus forming caves.

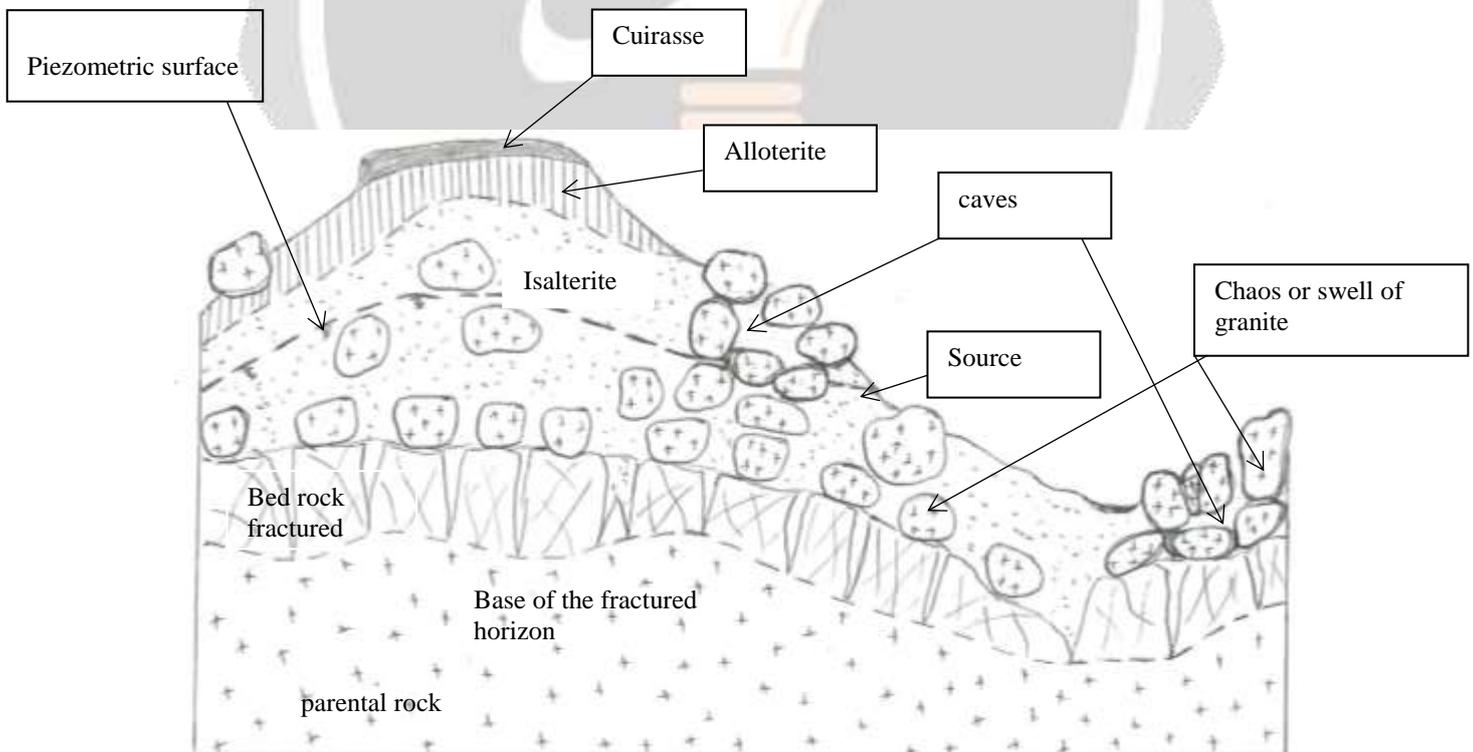


Fig- 8: Schematic drawing of disintegration into a ball of a granite massif

4.2 Cultural and scientific significances of water and rock [5]

Water and rocks (Vato) have various significances whether cultural or scientific

Table-1: Significances cultural and scientific of Water and Rock

	Cultural significance	Scientific significance
Water	It represents all the forces procured by the Creator. She is a healer, protector and purifier (she erases the sins and difficulties of believers) so water means life. Water also brings goods that is why a Malagasy affirmation insists that "ny tso-drano zava-mahery" (The blessing is sacred thing)	Water is a chemical compound. According to studies explaining the genesis of life, we can see that the appearance of life on Earth depends on the existence of water. Water always precedes the appearance of life so it is a source of life.
Rock	<p>It is:</p> <p>– a model: "Izay mitambatra vato, izay misaraka fasika" (its coherent formation means solidarity and its loose formation means that there is a break in solidarity). "Vato nasondrotry ny tany" (rocks released from the ground): is said of a person or a family having made a great effort before reaching an important place in the social life.</p> <p>– useful for memorizing a crucial event. "Vato namelan-kafatra" (rocks that we left messages). For the Malagasy, lifted stones are ways to memorize crucial events or stories for the new generation to know and remember "Vato kiboribory" (rock as a ball): refers to a person who has no family, child or friend</p>	<p>. A rock is an assemblage of minerals. In general, its formation is said to be coherent or hard: there is a solidarity or cohesion but after alteration and disintegration, the formation becomes loose, that is to say the solidarity is broken. Example: Sands (sedimentary rocks) are formed from metamorphic rocks and magmatic rocks that break up. The magmatic rocks come from the cooling of the magma. If it cools down deep during its rise, we will have a formation of the rocks of depth (or plutonic). In general, these rocks appear on the surface by erosion that is to say by the removal of their cover (ground). The stelae or raised stones are made by hard rocks. They are more resistant to erosion. So, from generation to generation, they can still see the works of their ancestors that make them know their origin. The ball shape comes from the alteration of rocks rich in silicate (example: granite, gabbro ...)</p>

5. CONCLUSION

Geoculture makes it possible to appreciate the value of various Malagasy cultures in relation to the rock or stone. The sacred character attributed to the rock "Vato" by the Malagasy society is recognized in the "Doany", tomb of the dead Kings.

In order to better preserve and enhance the geological heritage with cultural appeal, environmental education and public awareness of its importance and its links with the environment are needed. Educating also serves to support scientific research and its dissemination by encouraging dialogue between geo-scientists and the local population.

6. REFERENCES

- [1] PGRM. 2012. New geological and metallogenic maps from Madagascar to 1/1 000 000 with explanatory note. Geological Survey of Madagascar Ampandrianomby
- [2] BESAIRIE H. 1973. The various interpretations of the Malagasy basement. Geological Service of Madagascar.
- [3] RAJEMISA RAOLISON R. 1985. Rakibolana Malagasy. Bookshop Ambozontany Fianarantsoa. 1061p.

- [4] MANDIMBIHARISON A.J. et al 2016. For a better knowledge of the new concepts relating to the "Earth" as: Geodiversity, Geosite, Geoconservation, Geotourism, Geopark and Geoeducation in Madagascar. MadaHary, vol 5, 2016 p 19-37
- [5] RAJERISON H. 2011. Studies of cut stone through the commemorative temples of Antananarivo: ethnology essay on techniques. Master's thesis. Flsh. University of Antananarivo.
- [6] RASOLONJATOVO M. T. 2014. Links between culture on "vato" or rocks and their scientific significance (geoculture). Cases in the area of Andringitra, Ambohidratrimo District, Analamanga Region. Memory CAPEN CER Natural Sciences ENS.

