Octa Journal of Biosciences
International peer-reviewed journal
Octa. J. Biosci. Vol. 2(1): 20-27

ISSN 2321 – 3663
June 2014

Octa Journal of Biosciences

journal homepage: www.sciencebeingjournal.com

Impact of the creation of an orchard of cacao-trees (*Theobroma cocoa)* on the flora of kotokounou, a locality of Bocanda in Center-East of Côte d'Ivoire

Kouassi Kouadio Henri*[1], Kouassi Roland Hervé[2], Kouassi Kouadio Claude[1]and N'guéssan Koffi [3]

1. University Jean LorougnonGuédé, Research unit and of formation (UFR) Agro forestry; BP 150 Daloa (Côte d'Ivoire).
2. National High school of Côte d'Ivoire, 08 BP 10 Abidjan 08 Department of Sciences and Technologies, section of Life sciences and Earth.
3. University Felix HouphouetBoigny, Laboratory of Botany UFR Biosciences 22 LP 582 Abidjan 22.

ARTICLE INFO

Received 20 Feb.2014
Revised 18 Mar. 2014
Accepted 19 May 2014
Available online 16 Jun. 2014

Keywords:
Flora, impact, exploitation, orchard of cacao-tree, West, Côte d'Ivoire

Email:atoumanikouadiokan@yahoo.fr

ABSTRACT

This work relates to the identification and the evaluation of the impacts of the creation of orchards of cacao-trees on the flora of Kotokounou, a locality of Bocanda in the Center-East of Côte d'Ivoire. It comprises, the analysis of possible eco-climatic imbalances related on creation, the exploitation and the cessation of the activities on the flora of the perimeter of exploitation. Based on floristic inventories, the main aim was to characterize the impacts related to the flora destruction activities and maintenance of the orchards of cacao-trees of the targeted localitiesin order to put forward attenuation or corrective measures.The results showed that the flora of the study is rich approximately 109 species of which 5 have a particular status. This flora is slightly diversified and its characteristics predict risks of biological imbalances which can occur in short, average or long term.The flora is exposed to a gradual degradation related to the former activities of exploitation. Many impacts with which woody species diversity reduction, forest fragmentationand some species rarefaction in particular, the lianas were identified in this locality.The project linked activities were potential sources of negative impacts on the flora and have contributed to degrade it significantly.

INTRODUCTION

The natural heritage is more and more exposed to aggressions of any kind and undergoes a strong anthropic pressure. In many African countries, in particular in Côte d'Ivoire, the natural vegetation (forests) is frequently exposed to a dynamics as well on the level of the aspect as the floristic composition. Moreover, the land pressure is felt in a gradual way. The problems of rural land involved in the durable management of the ecosystems and environment, cause sometimes fatal conflicts. It is one of the immediate causes of climatic change. The reduction of natural spaces, the faunal exhaustion as well as the water resources are caused inter alia by the fast urbanization of rural environments, demography increase and the anarchistic exploitation of natural resources, etc. Face to these problems more and more, measurements of durable management of spaces and natural resources are recommended to prevent possible bioclimatic imbalances (Kouassiet al., 2013).One of security and protective measurements of the environment before any activity, source of deep disturbances of the ecosystems is the study of environmental impact (Kouassi et al 2013.Indeed, problems of the development, with its corollaries: destruction of many components of the nature requires the taking into account of exceptional measures aimed at minimizing the damage caused to the environment.Actually, human beings and animals are the ones which are exposed to the consequences of many destruction caused in the nature.This is why; any activity which prints environment impacts must be done in a reasoned way. The durable management of environment must integrate from now the realities of the medium of kind to support the life in all its forms in nature. This study carried out within the framework of this project made it possible to do the inventory of the flora of the site. It gives specific results on the characteristics of the flora and present in the analysis and the evaluation of the impacts, the risks and the consequences of exploitation in the short, average and long term on the flora of the site and those of the bordering zones.

MATERIALS & METHODS

The floristic inventory concerned the flora of the zone of Bocanda (Fig. 1). This zone belongs to the mesophilous sector and comprises nevertheless some species of Guinean savanna and semi-deciduous rainforestcharacterized by Aubrevilleakerstinguii and Khayagrandifoliola. It also gathers the type of forest characterized byCeltis spp., Triplochitonscleroxylon and its alternative characterized byNesogordoniapapaverifera and Khayaivorensis. Onenotes the existence of semi-deciduous rainforest,characterized by the quasi simultaneous fall of the sheets of the large trees. The species of the lower layers, dependent of the forest microclimate characterized by low contrasts.

However, the semi-deciduous forest does not occupy all the mesophilous sector, most of its surface is occupied by Guinean savanna..These savannas are the extents of high grasses wedged in the dense forests or ranging between the dense forests and the clear forests.

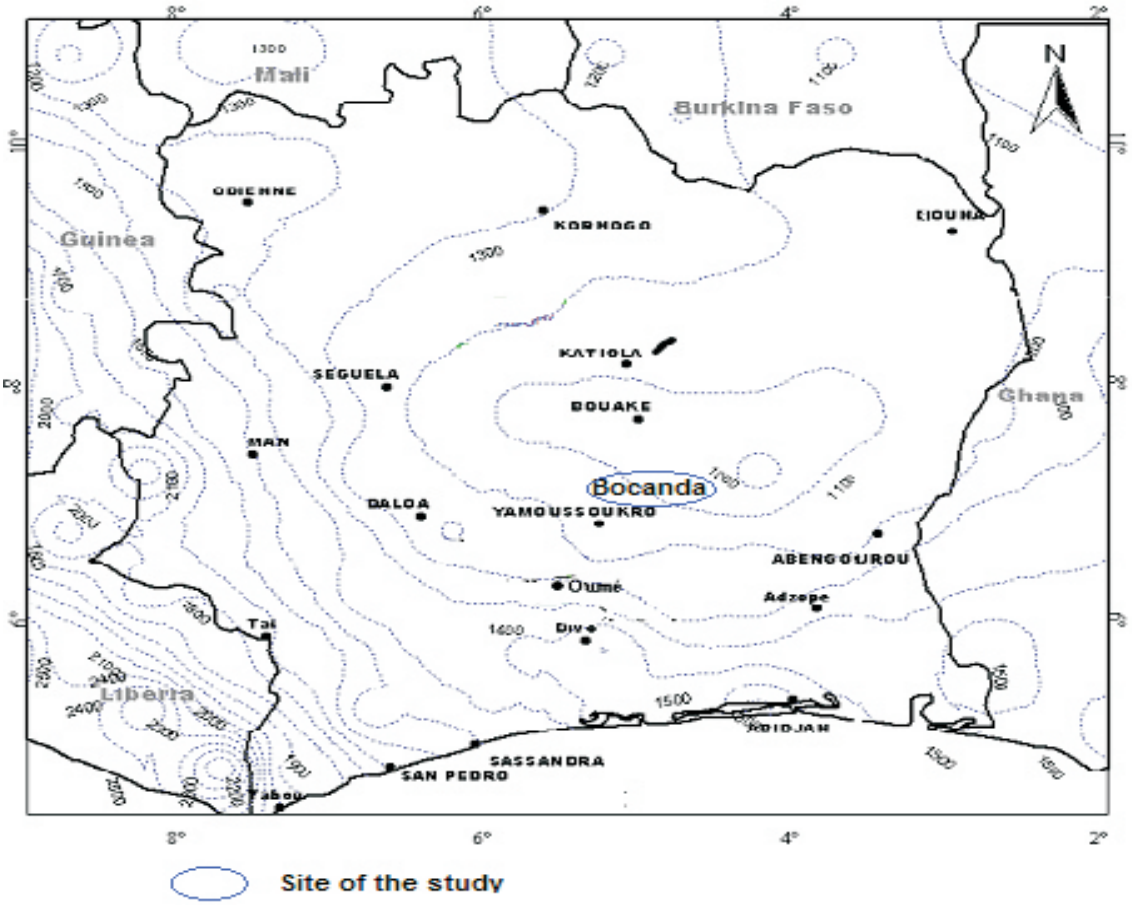

Fig.1: Localization of the site of study.

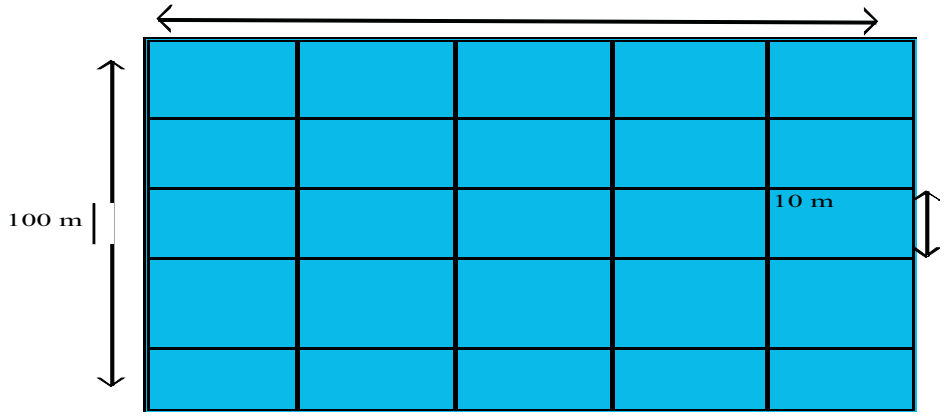

Fig. 2: Configuration of the plots of the flora inventories

Plot of Plot of flora inventories

However, the semi-deciduous forest does not occupy all the mesophilous sector, most of its surface is occupied by Guinean savanna..These savannas are the extents of high grasses wedged in the dense forests or ranging between the dense forests and the clear forests.
There is less than 7 consecutive months deficient in water, and less than 600 mm of cumulated annual water deficit. The inventory of the flora has been realized in two stages. The agrarian landscape,the contiguous forest formations and the savanna. The itinerant method was combined with that of the statements of surface of Gautier et al. (1994) during the inventory. Thus, the unit plot of 1 ha was subdivided in samples of 100 m ² (small squares of 10 m; Fig. 2). In total it was approximately 40 ha which was inventoried. Specific diversity and the species in particular status (endangered, in danger, vulnerable, at risk, endemic), were studied.

Flora analysis

The scientist uses several indices to express floristic diversity.However, the index of Shannon (1963) which will be used for the processing data is one of the most used. It expressionis: $H = - \sum Pi (Log\ pi)$. {With, pi = Fr/N, NR is the full number of inventoried species; Fr = F (a)/i, with, I = full number of plots and F (a) = number of appearance of a species during the inventory. The values evolve of 0 with log (NR), NR being the full number of inventoried species. The Equitability of Pielouis expressed starting from the index of Shannon. It expressionis : E = H/log (NR). E evolves from 0 to 1. Species distribution was appreciatedstarting from the absolute and relative frequencies and the index of Shannon in each locality. In addition, the floristic homogeneity of the mediums was appreciated starting from Equitability of Pielou.

RESULTS

Current state of the vegetation of the zone

The vegetations of the site in the past lush and rich in floristic and faunal species have been seriously fragmented (Fig.3).It comprises numerous species of fallow such: Chromolaenaodorata, Tremaguineensis, and the species of semi-deciduous forests such: Triplochitonscleroxylon, Griffonoasimplicifolia, Ceibapentandra, etc. The savanna comprises many species such: Pilostigmathoningii, Terminaliaglauscesens, Loudetia sp., Khayagrandifoliola, etc. In the herbaceous settlements, one notes the presence of: Imperatacylindrica, Penisetumsp,The index of diversity calculated is:H = 2.78 bits. The equitability of Pielou(E) calculated is: 0.41.

Fig. 3: The aspect of the vegetation.

Richness and specific diversity of the inventoried sites

109 species were inventoried on the site of the projet (table 1). By basing the flora analysis on the index of diversity (Shannon) estimation, one obtains the characteristics below (Table 1)

Table 1: List of the inventoried species on the sit.

S.No.	Species	Family	Fa	Fr	Pi	H
1	*Abrus canescens*	Fabaceae	1	0,125	0,001147	0,011202
2	*Abrus precatorius*	Fabaceae	2	0,25	0,002294	0,020111
3	*Acacia pennata*	Mimosaceae	4	0,5	0,004587	0,035634
4	*Adeniacissampeloides*	Passifloraceae	2	0,25	0,002294	0,020111
5	*Adeniarumicifolia*	Passifloraceae	3	0,375	0,00344	0,028153
6	*Ageratum conyzoides*	Asteraceae	1	0,125	0,001147	0,011202
7	*Albiziaadianthifolia*	Mimosaceae	1	0,125	0,001147	0,011202
8	*Albiziasp.*	Mimosaceae	6	0,75	0,006881	0,049426
9	*Albiziazygia*	Mimosaceae	1	0,125	0,001147	0,011202
10	*Alchorneacordifolia*	Euphorbiaceae	1	0,125	0,001147	0,011202
11	*Amaranthusviridis*	Amaranthaceae	1	0,125	0,001147	0,011202
12	*Anchomanesdifformis*	Araceae	1	0,125	0,001147	0,011202
13	*Antiaristoxicaria*	Moraceae	6	0,75	0,006881	0,049426
14	*Aspiliaafricana*	Astercaeae	3	0,375	0,00344	0,028153
15	*Baphianitida*	Fabaceae	1	0,125	0,001147	0,011202
16	*Blighiasapida*	Sapindaceae	5	0,625	0,005734	0,042696
17	*Bombax costatum*	Bombacaceae	3	0,375	0,00344	0,028153
18	*Borassus aethiopum*	Arecaceae	1	0,125	0,001147	0,011202
19	*Cardiospermumgrandiflorum*	Sapindaceae	5	0,625	0,005734	0,042696
20	*Caricapapaya*	Caricaceae	4	0,5	0,004587	0,035634
21	*Cassia hirsuta*	Caesalpiniaceae	4	0,5	0,004587	0,035634
22	*Cassia obtusifolia*	Caesalpiniaceae	1	0,125	0,001147	0,011202
23	*Cassia occidentalis*	Ceasalpiniaceae	1	0,125	0,001147	0,011202
24	*Ceibapentandra*	Bombacaceae	8	1	0,009174	0,062093
25	*Celtiszenkeri*	Ulmaceae	1	0,125	0,001147	0,011202
26	*Centrosemapubescens*	Fabaceae	1	0,125	0,001147	0,011202
27	*Miliciaregia*	Moraceae	1	0,125	0,001147	0,011202
28	*Chromolaenaodorata*	Asteraceae	8	1	0,009174	0,062093
29	*Cnestisferruginea*	Connaraceae	1	0,125	0,001147	0,011202
30	*Cnestis* sp.	Connaraceae	3	0,375	0,00344	0,028153
31	*Cola caricaefolia*	Sterculiaceae	4	0,5	0,004587	0,035634
32	*Cola gigantea*	Sterculiaceae	3	0,375	0,00344	0,028153
33	*Combretetumracemosum*	Combretaceae	4	0,5	0,004587	0,035634
34	*Combretumzenkeri*	Combretaceae	7	0,875	0,008028	0,055878
35	*Commelina*sp.	Commelinaceae	2	0,25	0,002294	0,020111
36	*Costus afer*	Zingiberaceae	1	0,125	0,001147	0,011202
37	*Croton hirtus*	Euphorbiaceae	5	0,625	0,005734	0,042696
38	*Cyathulaprostrata*	Amaranthaceae	2	0,25	0,002294	0,020111
39	*Cyperus* sp	Cyperaceae	1	0,125	0,001147	0,011202
40	*Delonixregia*	Caesalpiniaceae	2	0,25	0,002294	0,020111
41	*Desmodiumsalicifoliurh*	Fabaceae	2	0,25	0,002294	0,020111
42	*Dioscoreaalata*	Dioscoreaceae	1	0,125	0,001147	0,011202
43	*Dioscoreaminutiflora*	Dioscoreaceae	1	0,125	0,001147	0,011202
44	*Dioscoreasmilacifolia*	Dioscoreaceae	2	0,25	0,002294	0,020111
45	*Diospyros* sp.	Ebenaceae	1	0,125	0,001147	0,011202
46	*Euphorbiaheterophylla*	Euphorbiaceae	1	0,125	0,001147	0,011202
47	*Euphorbiahirta*	Euphorbiaceae	3	0,375	0,00344	0,028153
48	*Ficus exasperata*	Moraceae	5	0,625	0,005734	0,042696
49	*Ficus* sp.	Moraceae	1	0,125	0,001147	0,011202
50	*Ficus sur*	Moraceae	3	0,375	0,00344	0,028153

51	*Glycine max*	Fabaceae	1	0,125	0,001147	0,011202
52	*Griffoniasimplicifolia*	Caesalpiniaceae	6	0,75	0,006881	0,049426
53	*Holarrhenafloribunda*	Apocynaceae	8	1	0,009174	0,062093
54	*Hoslundiaopposita*	Labiatae	1	0,125	0,001147	0,011202
55	*Hyparrheniawelwitschii*	Poaceae	1	0,125	0,001147	0,011202
56	*Ipomoeapes-caprae*	Convolvulaceae	1	0,125	0,001147	0,011202
57	*Ipomoea* sp.	Convolvulaceae	3	0,375	0,00344	0,028153
58	*Khayaivorensis*	Meliaceae	1	0,125	0,001147	0,011202
59	*Licopersicumsculentum*	Solanaceae	3	0,375	0,00344	0,028153
60	*Loudetia* sp.	Poaceae	1	0,125	0,001147	0,011202
61	*Mallotusoppositifolius*	Euphorbiaceae	8	1	0,009174	0,062093
62	*Margaritariadiscoidea*	Euphorbiaceae	7	0,875	0,008028	0,055878
63	*Mariscuscylindristachus*	Cyperaceae	5	0,625	0,005734	0,042696
64	*Mezoneuronbenthamianum*	Caesalpiniaceae	4	0,5	0,004587	0,035634
65	*Miliciaexselsa*	Moraceae	1	0,125	0,001147	0,011202
66	*Momordicacharantia*	Cucurbitaceae	4	0,5	0,004587	0,035634
67	*Mondiawhitei*	Periplocaceae	1	0,125	0,001147	0,011202
68	*Morindalucida*	Rubiaceae	1	0,125	0,001147	0,011202
69	*Motandraguineensis*	Euphorbiaceae	1	0,125	0,001147	0,011202
70	*Mucunapruriens*	Fabaceae	5	0,625	0,005734	0,042696
71	*Musa parasidiaca*	Musaceae	6	0,75	0,006881	0,049426
72	*Nelsoniacanescens*	Ancanthaceae	1	0,125	0,001147	0,011202
73	*Nesogordoniapapaverifera*	Sterculiaceae	1	0,125	0,001147	0,011202
74	*Newbouldialaevis*	Bignoniaceae	5	0,625	0,005734	0,042696
75	*Olaxsub-scorpiodes*	Olacaceae	4	0,5	0,004587	0,035634
76	*Olyralatifolia*	Poaceae	3	0,375	0,00344	0,028153
77	*Oplismenussp*	Poaceae	2	0,25	0,002294	0,020111
78	*Parquetinanigrescens*	Periplocaceae	3	0,375	0,00344	0,028153
79	*Penisetumsp*	Poaceae	2	0,25	0,002294	0,020111
80	*Phylanthussp.*	Euphorbiaceae	1	0,125	0,001147	0,011202
81	*Phyllanthus amarus*	Euphorbiaceae	2	0,25	0,002294	0,020111
82	*Phyllanthus muellerianus*	Euphorbiaceae	1	0,125	0,001147	0,011202
83	*Physalis anguculata*	Solanaceae	3	0,375	0,00344	0,028153
84	*Physalis micrantha*	Solanaceae	1	0,125	0,001147	0,011202
85	*Pilostigmathonningii*	Caesalpiniaceae	2	0,25	0,002294	0,020111
86	*Pouzolziaguineensis*	Urticaceae	7	0,875	0,008028	0,055878
87	*Pseudospondiansmicrocarpa*	Anacardiaceae	1	0,125	0,001147	0,011202
88	*Raphia soudanica*	Arecaceae	1	0,125	0,001147	0,011202
89	*Rauvolfiavomitoria*	Apocynaceae	1	0,125	0,001147	0,011202
90	*Ricinodendronheudelotii*	Euphorbiaceae	4	0,5	0,004587	0,035634
91	*Rothboeliacochensinensis*	Poaceae	1	0,125	0,001147	0,011202
92	*Secamoneafzelii*	Asclepiadaceae	3	0,375	0,00344	0,028153
93	*Setariabarbata*	Poaceae	3	0,375	0,00344	0,028153
94	*Sida acuta*	Malvaceae	4	0,5	0,004587	0,035634
95	*Sida* sp.	Malvaceae	1	0,125	0,001147	0,011202
96	*Smilax kraussiana*	Smilacaceae	2	0,25	0,002294	0,020111
97	*Solanumnigrum*	Solanaceae	1	0,125	0,001147	0,011202
98	*Solanumrugosum*	Solanaceae	5	0,625	0,005734	0,042696
99	*Solanum* sp.	Solanaceae	1	0,125	0,001147	0,011202
100	*Spige-lia anthelmia*	Loganiaceae	5	0,625	0,005734	0,042696
101	*Spondias monbin*	Anacardiaceae	8	1	0,009174	0,062093
102	*Sterculiatragacantha*	Sterculiaceae	7	0,875	0,008028	0,055878
103	*Terminaliaglauscesens*	Combretaceae	1	0,125	0,001147	0,011202
104	*Theobroma cacao*	Sterculiaceae	6	0,75	0,006881	0,049426
105	*Trajabenthamii*	Euphorbiaceae	1	0,125	0,001147	0,011202
106	*Tremaorientalis*	Ulmaceae	6	0,75	0,006881	0,049426
107	*Triplochitonscleroxylon*	Sterculiaceae	4	0,5	0,004587	0,035634
108	*Uvaria* sp.	Anonaceae	1	0,125	0,001147	0,011202
109	*Zanthoxylumzanthoxyloides*	Rutaceae	1	0,125	0,001147	0,011202
					H	2,779,946
					E	0,410737

Species with particular status inventoried on the site. Five (5) species with particular status were inventoried in this flora (table 2). Among these species, some are vulnerable (Fig. 4) and others at the risk (Fig. 5).

Table 2: Species with particular status.

S.No.	Species	Family	Status
1	*Khayaivorensis*	Meliaceae	Vulnerable (UICN, 2012)
2	*Milicia excels*	Moraceae	Vulnerable (UICN, 2012)
3	*Miliciaregia*	Moraceae	Vulnerable (UICN, 2012)
4	*Nesogordoniapapaverifera*	Sterculiaceae	Vulnerable (UICN, 2012)
5	*Triplochitonscleroxylon*	Euphorbiaceae	risk (UICN, 2012)

Fig. 4: Branch of Nesogordoniapapaverifera.

Fig. 5: Triplochitonscleroxylon.

Identification and analyzes and evaluation of the impacts

The analysis of the data collected during the investigations highlight the various impacts of the realization of the project on the floristic communities (Fig. 6).The evolution of the curves (Fig. 6) shows the variation of the impacts characteristic of the activities sources of impact during the three (3) phases of the project (creation, exploitation and the end of the project) on the flora and the vegetation of the zones concerned by the exploitation and on that of the contiguous vegetable formations. With the analysis, work of afforestation and installation (RS) has an impact with strong intensity (3) and long range (3). But this activity has a short duration (1) and average importance (2). The impacts related to the regular maintenance of the site have a strong intensity (3) and a long duration (3). On the other hand, these impacts have average range (2) and average importance (2). The impacts related on destruction and slicing during all the phases of the project have a high intensity (3) and have an average importance (2). On the other hand these activities generated impacts in short time (1) and lowrange (1).

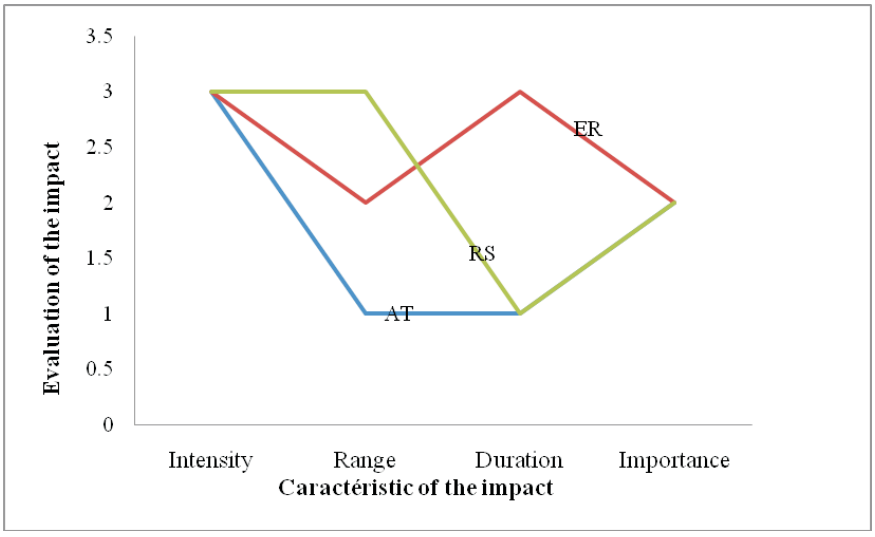

Fig. 6: Characterization of the parameters related to the impacts according to the activities sources of impact, with (ER = regular Maintenance; RS = Afforestation of the site AT = destruction and slicing)

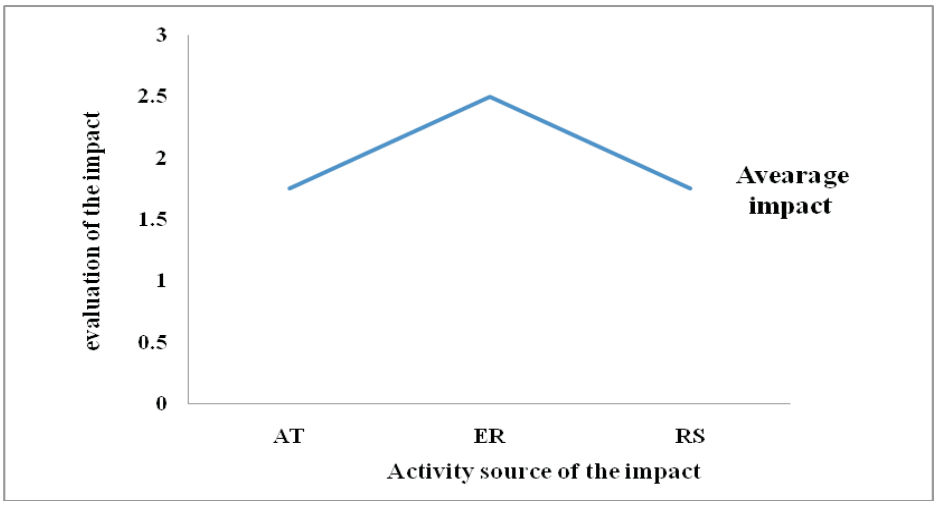

Fig. 7: Evolution of the average impacts according to the activities sources of impacts, with (ER = regular maintenance; RS = Afforestation of the site AT = demolition and slicing).

The shape of the curve of the evolution of the average impacts of the activities linked to the project on the flora (Fig. 7) shows the high average impacts (2.5), with the regular maintenance of the site (ER) and certain contiguous formations. In addition, the average impacts related to the activities of destruction and afforestation of the site are relatively average (1.75).

DISCUSSION

Richness and floristic diversity

The analysis of the flora of the site showed that it is approximately rich of 109 species, lowdiversified (H= 2.78 bits) and fairly homogeneous (E = 0.41). The various activities undertaken in this zone were ecological sources of disturbances, and can be regarded as major disturbances on the floristic diversity of the site. This disturbance influenced significantlythe floristic homogeneity and the stability of the medium. The low value of Equitability (0.41) of Pielou is an indicator of this instability. Indeed, the vegetable formations of the site have inherited a very intense agricultural past. According to work of Monier (1983), Leguminosae, Ulmaceae, and Sterculiaceae are the families of dominant plants, while Meliaceae, Sapotaceae, Moraceae, Bombacaceae, Combretaceae and Myristicaceae, because of their intense exploitation, became far from important.

Species with particular status

Two lists allowed to define and to identify the species with particular status of the site:the classification of AKE ASSI (2002) and the list of UICN (2012). The Methods of UICN (2012) classification obey to international scientific standards founded on permanent floristic inventories aiming at evaluating the geographical distribution and the distribution of the species in different biomes, the density of these species per unit of area, their state in their medium of life and their reaction face to the climate changes (methods of adaptation of these species to the global changes), their mode of dissemination (reproduction by seed or vegetative way, etc.). The same methods were regularly used by AKE ASSI (2002) to investigate the flora of Côte d'Ivoire. The characterizations of AKE ASSI (2002) take mainly into account the flora ofCôte d'Ivoire and remain more restrictive. The five (5) identified particular species were classifiedin this statusbecause of their abusive exploitation. Also, certain eco-biological factors constantly influence the vulnerability of the species with particular status. Some are in fact the shapes of perpetuation of the woody plants. Indeed, these plants practice two forms of reproduction (sexed and vegetative). The sexed reproduction of inventoried species is most known. Theirvegetative regeneration is lowknown in Côte d'Ivoire.Among the species with particular status like, Miliciaexcelsa, Triplochitonsclé roxylon, Nesogordoniapapaverifera, etc., the main way of perpetuation is ensured by the seeds. It is one of the reasons which explain the threat and the risks of extinction which planes on these species. Moreover, the weak dissemination of seeds and the abusive exploitation of these species for utility needs (sawlog, plant medicinal, plants food etc.) weaken them more

.

Environmental impacts

The environmental impacts were observed during all the phases of the project. During the phase of exploration, woody species destructionfor the creation of the cacao plantationsinvolved some species destruction onthe site of the project. Some specimens of trees, shrubs, lianas and herbaceous were destroyed. The regular cutting in the flora contributed to increase significantlythe luminosity on the ground in these usually closed formations exposing the species of the underwood very sensitive to excesses of light. The epiphytes were found on the ground after the destruction of the large trees. All these movements involved an ecological imbalance within the vegetable formations concerned. During the production period, the extent of the disturbances was accentuated with the regular maintenance of the plantations. The destruction became more importan

on the exploitation sites because of the permanent presence of staff on the site.The maintenance and the permanent presence of the staff were sources of major disturbances in the flora.These disturbances are sometimes opposed the natural regeneration of the plant species. During the closing of the project, the original vegetation was deeply started. The aspect of the vegetation was modified. Species like Terminaliaglauscesens, Khaya sp., initially present in savannas are very threatened besides those known of the UICN (2012) list today.The rich and diversified primary vegetation disappeared and has let new vegetation mainly constituted by the herbaceous and some woody species.The surrounding formations have so much suffering of human pressure so they are more degraded. On the whole, the zone lost its vegetable formations rich and diversified and the biodiversity regressed considerably under the pressures of anthropic origins.Many activities can compromise natural regeneration if urgent measures are not taken. Indeed, the regeneration of the forest species is slow like it was mentioned by Kouassi et al. (2013). The characterization and the evaluation of the impacts on the flora of the site are supposed to bring a thorough lighting on the nature (intensity, extended and lasted) of the impacts. Thus, the intense impacts were caused by the regular maintenance of the plantations of the site which implies sometimes regular cuts of ligneous family and the anthropisation of the front natural environment, during and at the end of the project. The regular maintenance of the site which includes destruction of certain woody species. These activities sometimes compromise the regeneration of the woody species like announced by Mitja (1993) in forest zone and Yossi (1996) in savanna zone. On the other hand the activities linked to destruction and the afforestation (installation of the site), have generated average impacts probably because of law punctures made in the flora during these activities. The impacts caused by installations are average because the afforestation carried out was quantitatively low. Moreover, the forest woody speciesused have a slow growth (Alexandre, 1989, Kouamé, 1998, Ettien, 2005 and Kouadio, 2007) and are often exposed to the blow of the climatic variations.

Main sources of impact

The main source of impact is the regular maintenance of the vegetable formations and the regular cutting in the flora for utility needs. Indeed, these activities are intense, long and important. Also, many cuts in the flora have an additive effect on that of the anthropisation of the vegetable formations.

CONCLUSION

Many crop years have seriously contributed to the puncture of woody species numerous species of the flora. The flora of the site is rich and slightly diversified. In spite of the many disturbances recorded within this flora, five (5) species with particular status were inventoried. Moreover, it still comprises lush vegetation in full reconstitution. In addition, the low floristic diversity influences significantly the floristic homogeneity. The low homogeneity testifies to the fragile stability of the flora of the site. The floristic diversity will be seriously influenced by the installation, and the project execution. However, the recommended measures of attenuation will contribute significantly to attenuate the impacts related to the execution of the project. With this intention the afforestation containing the woody leguminous plants and the protection of certain vegetation of the site can greatly contribute to the reduction the eco-biological risks which could occur during and after the projet execution.

REFERANCES

1. Aké Assi, L. (2002) ;Flora of Côte d'Ivoire: catalogue systematic, biogeographic and ecology. II. Boissiera 58..

2. Ettien DT. (2005) ;Potentials of regeneration of the commercial forest petrols by the germination of seeds, in the classified forest of Haut-Sassandra (Mid-west of Côte d'Ivoire). Doctorate of 3è cycle, U.F.R. Biosciences, University of Abidjan-Cocody (Côte d'Ivoire), p. 259.

3. Gautier, L., Chatelain, C.V. and R. Spichiger (1994); Presentation of a relevemethode for vegetation studies based on high resolution satellite imagery In: comptesrendus de la treizième reunion plénière de l'A.E.T.F.A.T., Zombamalawi. Nat. Herb. Bot. Gard. Malawi. Vol. 2: 1339-1350.

4. Kouassi Kouadio Henri, TRA-Bi Fezan Honora, Kouassi Roland Hervé (2013) ; Impacts of the iron ore extraction on the flora of the localities of Bangolo and Logoualé west of Côte d'ivoire, *International Journal of Advanced Research* .Volume 1, Issue 9, 167-176.

5. Kouamé N. F. (1998);Influence of forest exploitation on the vegetation and the flora of the classified forest of Haut-Sassandra (South-western of Côte d'Ivoire). Doctorate of 3rd cycle, UFR Biosciences, Univ. Cocody-Abidjan, (Côte d'Ivoire), 227.

6. KouassiKouadio Henri, TRA-Bi FezanHonora, Kouassi Roland Hervé (2013) ; Impacts of the iron ore extraction on the flora of the localities of Bangolo and Logoualé west of Côte d'ivoire, International Journal of Advanced Research (2013), Volume 1, Issue 9, 167-176.

7. Mitja D. et H. Puig. (1993);Essartage itinerant culture and reconstitution of the vegetation of the fallow in wet savanna of Ivory Coast (Booro-Borotou). In: CH. Floret and G Serpantié (eds), fallow in West Africa, Collection: Conferences and Seminars. ORSTOM, Paris, 377-392.

8. Monnier Y. (1983) ;Hydrology, vegetation, soils. Jeune Afrique, Atlas of Côte d'ivoire., 2è edition, pp. 10-21.

9. Shannon & Weaver (1948);The mathematical théory of communication, Urbaka un. Press Illinois.

10.UICN. (2009); IUCN Red List of Threatened Species.www. iucnredlist.org.

11. Yossi H. (1996);Dynamics of the post-farming vegetation in zone soudanienne in Mali.Doctorate, Population environment, ISFRA, University of Bamako, 154.