

Full Length Research Paper

Nigeria's inland basins: Investment opportunities and environment

***Mukhtar Habib and Congjiao Xie**

Faculty of Earth Resources, China University of Geosciences, Key Laboratory of Tectonics and Petroleum Resources, Ministry of Education, Wuhan, Hubei, 430074, China

*Corresponding Author E-mail: mukhtarhabib102@gmail.com

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The Federal Republic of Nigeria is a federal constitutional republic comprising 36 states and its Federal Capital Territory, Abuja. The country is located in West Africa and shares land borders with the Republic of Benin in the west, Chad and Cameroon in the east, and Niger in the north. Its coast in the south lies on the Gulf of Guinea on the Atlantic Ocean. Nigeria is Africa's most populous nation with a teeming population of over 170 million people having and occupies a surface area of about 924,000 square kilometers with a variety of abundant natural resources. The most exploited natural resource in Nigeria is Petroleum, the largest industry and main generator of GDP. However, recent findings suggest that the petroleum potentials of Nigeria have not been fully realized, particularly with regards to its inland basins. Nigeria's inland basins have been highly underexplored principally due to the abundance of oil in the Niger Delta. These inland basins constitute one set of a series of Cretaceous and later rift basins in central and west Africa whose origin is related to the opening of the South Atlantic. Commercial hydrocarbon accumulations have been discovered in Chad, Niger and Sudan in this rift trend. Oil has been discovered in commercial quantities in the Lower Benue Trough (Anambra) inland basin of Nigeria, by orient oil petroleum resources plc in 2012. Petroleum Geochemistry result from Nigeria's Inland Basins (excluding Sokoto basin) provided where analyzed, re-evaluated and summarized by this paper so as to further establish the prospects of petroleum and/or gas in the region. Nigeria's oil industry structure and operational mode was examined in order to educate potential investors. Results were all positive with regards to petroleum exploration in the lower Benue Trough showing early oil window (oil prone), Middle Benue Trough showing late oil window (gas prone), Upper Benue Trough showing middle to late oil window (more oil than gas prone), Chad Basin showing gas window (gas prone) and Mid Niger basin showing prematurity. It was further realized by this paper that Nigerian government had since dedicated a ministry coupled with different subsidiaries to take care of petroleum upstream and downstream sector. The most inviting contract arrangement by the Nigerian government is the Production Sharing Contract (PSC), in which NNPC on behalf of the Nigerian government engages an international oil company or indigenous private investor as Contractor to conduct petroleum operations on behalf of itself and NNPC the Contractor is responsible for financing all the costs of the various stages of petroleum operations, i.e. Exploration, development and production. If the exploration is successful, the Contractor will be entitled to recover its costs together with reasonable profit on commencement of commercial production. China National Petroleum corporation exploration program in Niger republic, Chad republic and Sudan republic was a classical textbook example of a successful drilling campaign, from concept to exploration and development, in an untested, remote, high-risk, and high-cost area. With relentless and rejuvenated geological and geophysical studies, particularly with respect to the evaluation of potential petroleum systems, commercial success may also be achieved in the Nigeria's inland basins.

Keywords: Inland Basins, Nigeria, Geochemistry, Contract, Petroleum, Investment.

HISTORY AND BACKGROUND

Nigeria's current national petroleum reserves asset (proven), put at 32 billion bbl. of oil and about 170 trillion standard ft³ of gas (Nexant, 2003), derives solely from the Niger Delta onshore and offshore. Some exploration campaigns have been undertaken in the inland basins with the aim of expanding the national exploration and production base and thereby add to the proven reserves asset. The inland basins of Nigeria comprise the Lower Benue Trough (Anambra basin), the middle Benue trough, upper Benue trough, the southeastern sector of the Chad basin, the Mid-Niger (Bida) basin, and the Sokoto basin (Figure 1).

The inland basins of Nigeria constitute one set of a series of Cretaceous and later rift basins in central and West Africa whose origin is related to the opening of the South Atlantic (Figure 2 and 3). Commercial hydrocarbon accumulations have recently been discovered in Chad and Sudan in this rift trend. In southwest Chad, exploitation of the Doba discovery (with an estimated reserve of about 1 billion bbl. of oil) has caused the construction of a 1070-km (665-mi)-long pipeline through Cameroon to the Atlantic Coast. In Sudan Republic, some giant fields (Unity 1 and 2, Kaikang, Heglig, etc.) have been discovered in the Muglad basin (Mohamed et al., 1999). The major source rocks and reservoirs are in the Aptian–Albian–Cenomanian continental deposits of the Abu Gabra and Bentiu formations, respectively, which are similar and can be correlated with the well-developed Bima Sandstone in the Nigerian upper Benue trough. In the Republic of Niger, oil and gas shows have also been encountered in Mesozoic–Cenozoic sequences in the east Niger graben, which is structurally related to the Benue, Chad, Sudan, and Libyan rift complexes (Zanguina et al., 1998).

In the inland basins of Nigeria, the Nigerian National Petroleum Corporation, through its frontier exploration services arm, National Petroleum Investment Management Services (NAPIMS), has drilled some wells in the Nigerian sector of the Chad basin, and only gas shows were encountered. The first well in the Benue trough region, Kolmani River 1, drilled by Shell Nigeria Exploration and Production Company to a depth of about 3000 m (9850 ft) in 1999, encountered some 33 billion standard ft³ of gas and little oil (that has been the only well drilled by that company in that area to date). Two other wells, Kuzari 1 and Nasara 1, drilled by Elf Petroleum Nigeria Limited (TotalFinaElf) in 1999 to a depth of 1666 m (5465 ft) and Chevron Nigeria Limited (ChevronTexaco) in 2000 to a depth of about 1600 m (5250 ft), respectively, were reportedly dry (Figure 4). With this development, it has become necessary to evaluate the prospects of this frontier region, especially the availability or otherwise of favorable petroleum systems.

In this work, we re-analyze and summarize the result provided by *Obaje et al.*, on the petroleum geochemistry of Nigeria's Inland Basins with the exception of Sokoto Basin, so as to further prove to potential investors that an opportunity exist in there for petroleum exploration and later production. We further went ahead to examine the structure and operational mode of the Nigeria's oil and gas industry in order to give a complete picture of the investment opportunities.

Nigeria's Inland Basins

Petroleum Potential

The petroleum potentials of Nigeria's Inland Basins where analyzed in this section with exception of the Sokoto Basin. This is achieved by evaluating the source rock qualities of cretaceous tertiary sequence as a preliminary step to establish the existence or otherwise of any petroleum systems and prospects of commercial value in that region

Sample collection

Lower Benue Trough (Anambra Basin)

In the Anambra basin, outcrop samples were obtained from the Nkporo shale at Leru (NKPO), the Enugushale at Enugu (ENUG), and the Mamu Formation (coals) at the Miliken Hills section near the Onyeama coal mine at Enugu (MAMU).

Middle Benue Trough

In the middle Benue trough, outcrop samples (mainly coals) were collected along the bank of River Dep in Jangwa near Obi (MBJJ, OBIC)

Upper Benue Trough

Outcrop and some shallow borehole samples of the following formations, Bima (at Lamurde: BIMA), Yolde (at Futuk and Gombe: YOLD, MYS), Dukul (at Lakun: DUKL, MDS), Gongila (at Ashaka: GONG, MGS), Pindiga (at Gombe and Pindiga: PIND, MPS), Lamja (coals at Lamja: LAMCO), Gombe (coals at Doho, Haman Gari, and Wuro: UBDJ, UBHJ, UBWJ, MGMC) were collected

Chad Basin

Well samples from Kemar-1 (KM-1), Murshe-1 (MS- 1),

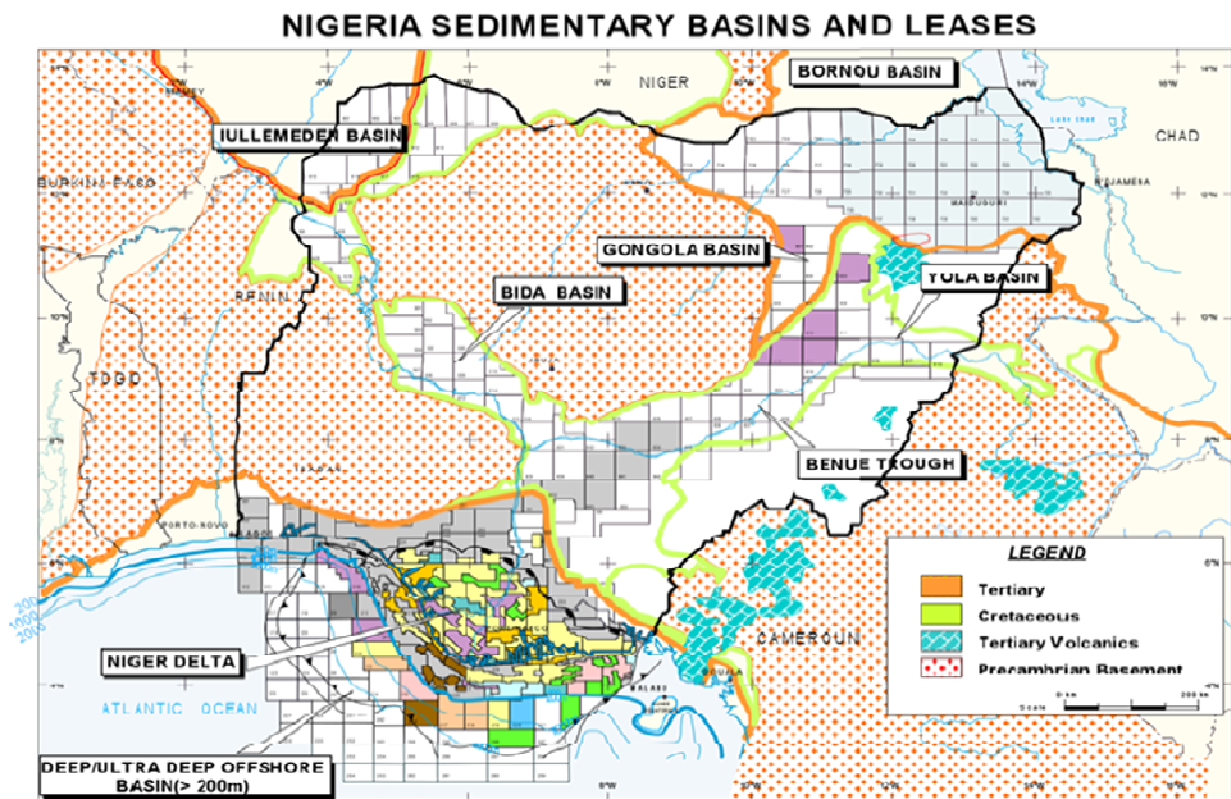


Figure 1. Sketch geological map on Nigeria showing the inland basins and sample localities.

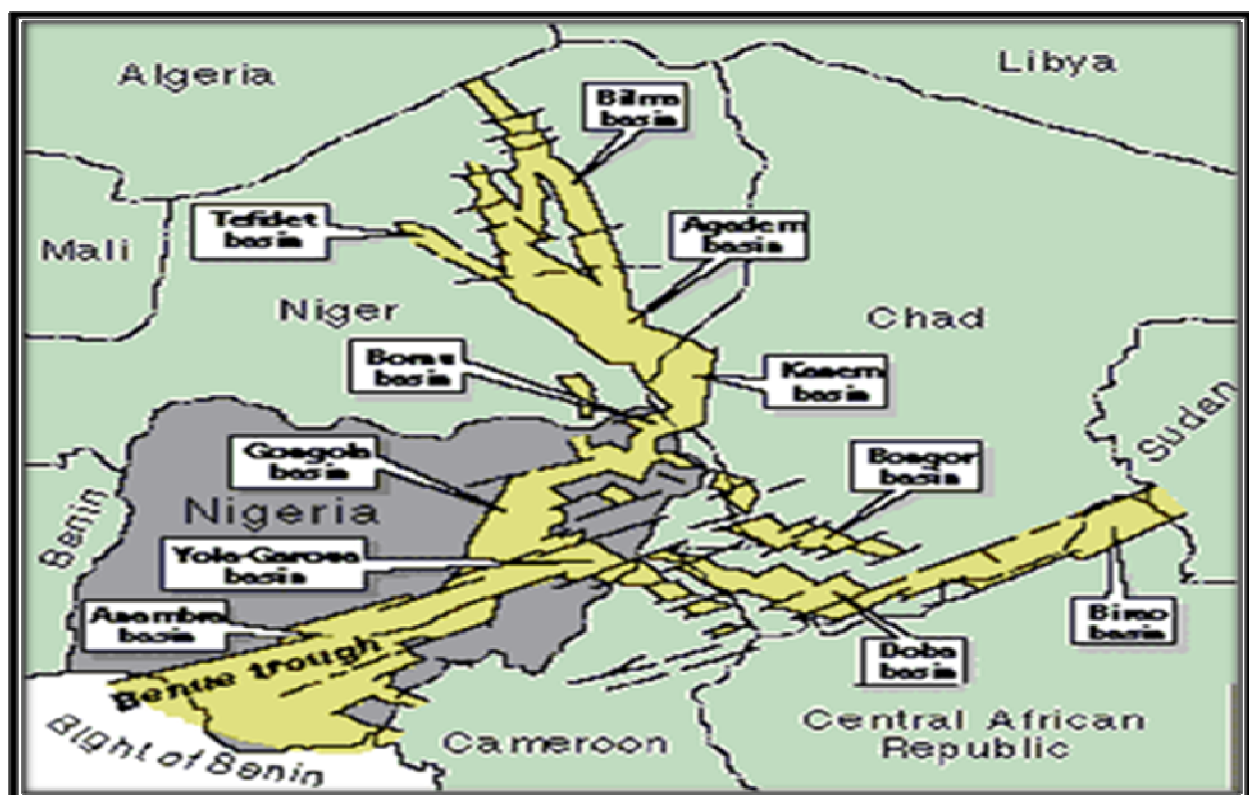


Figure 2. Relationship between Benue trough with the central and west African Rift system.

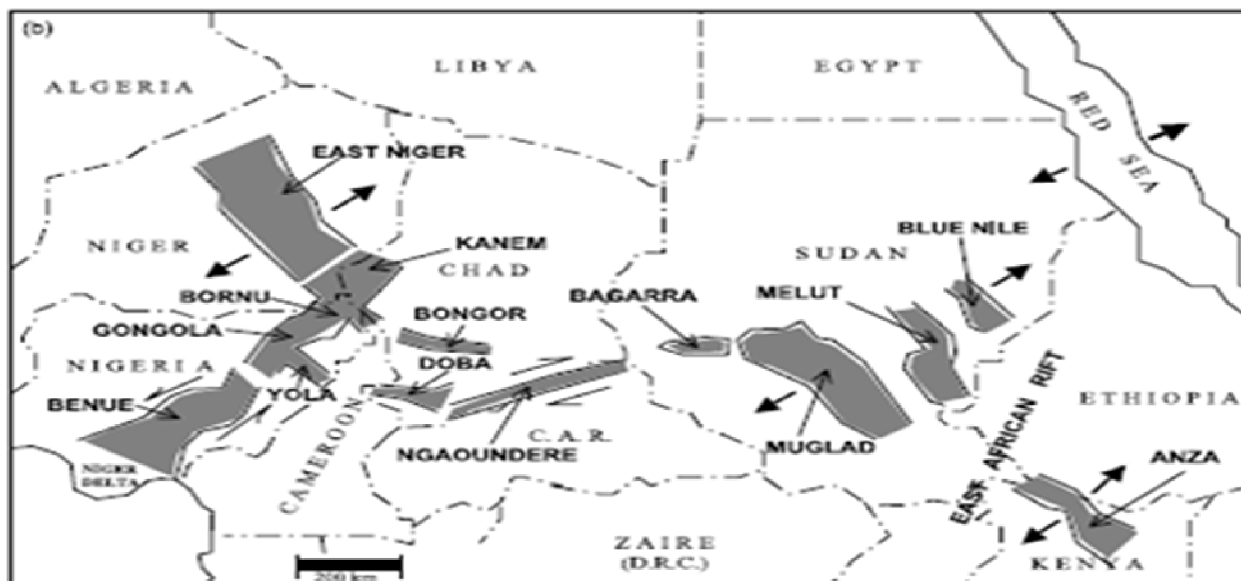


Figure 3. Regional tectonic map of western and central African rifted basins showing the relationship of the Muglad, Doba, and east Niger basins to the Benue trough/Gongola basin. Locations of regional shear zones (marked with half-arrow) and major zones extension (complete arrow) are shown (adapted from Schull, 1988).

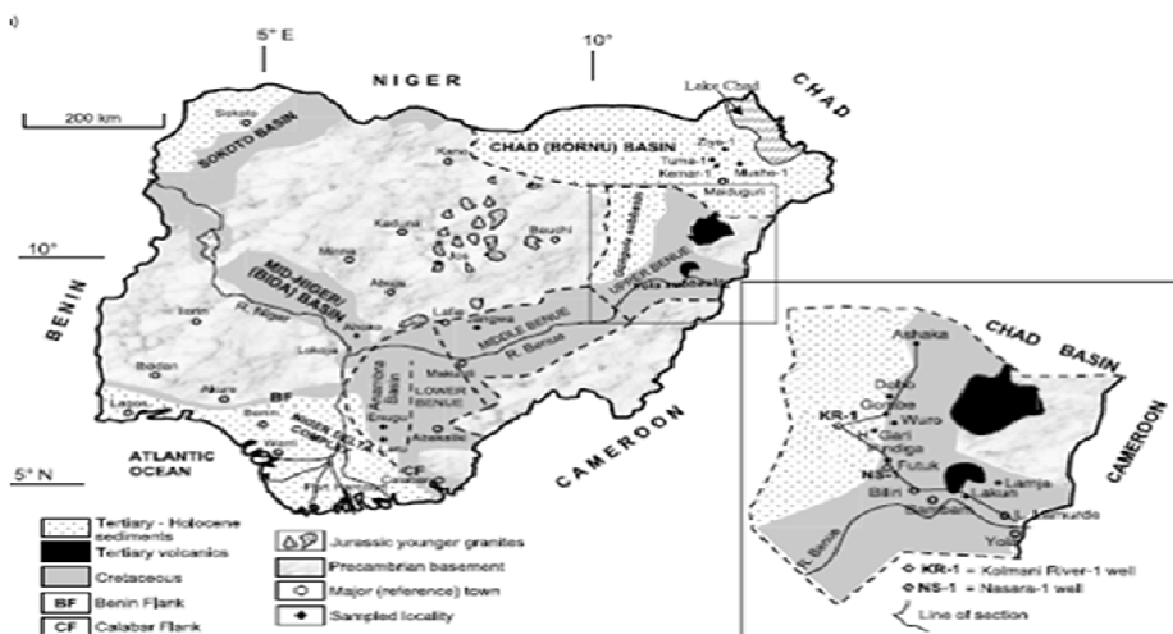


Figure 4. Geological map of Nigeria showing the inland basins and sample localities (inset: upper Benue trough).

Tuma-1 (TM-1), and Ziye-1 (ZY-1) constitute the study materials from the Chad basin.

Mid Niger Basin

In the Mid-Niger basin, outcrop samples of the Lokoja and Patti formations (AHOK) were collected from the road cut section at Ahoko on the Lokoja-Abaji road.

Procedure

Samples from all the formations were subjected to organic geochemical and organic petrologic studies comprising the following:

- TOC determination to estimate the quantity of organic matter in each sample.
- Rock-Eval pyrolysis to determine the hydrocarbon generative potential of the organic matter (S1, S2, S3,

Tmax, and the derivatives HI and OI).

- iii. Vitrinite reflectance (Ro) to determine the maturity of the envisaged source rocks.
- iv. Maceral analysis to evaluate the relative proportions of the hydrocarbon-prone macerals.
- v. Gas chromatography and gas chromatography–mass spectrometry for biomarker assessments of the nalkane distribution, pristane/phytane ratios, odd over-even predominance, regular steranes distribution, transformation ratios of 17a(H)-trisnorhopanes to 18a(H)-trisnorhopanes, as well as moretanes to 17a(H)21b(H)-hopanes.

All samples were prepared according to standard organic geochemical (e.g., Espitalie' et al., 1977; Waples and Machihara, 1991; Pratt et al., 1992; Petersen et al., 2000; Jovancicevic et al., 2002) and organic petrologic (e.g., Stach et al., 1982; Bustin et al., 1985; Obaje, 1994; Obaje and Abaa, 1996; Taylor et al., 1998) sample preparation methods.

At the core of any petroleum system is a good-quality source rock (total organic carbon [TOC] > 0.5%, hydrogen index [HI] > 150 mg HC/g TOC, liptinite content > 15%, Tmax < 430°C, and Ro 0.5–1.2%, biomarker validation).

RESULT

Lower Benue Trough (Anambra Basin)

High TOC contents (as much as 60.8 wt.%) and HI between 266 and 327 mg HC/g TOC characterize the coal beds of the Mamu Formation. The underlying Nkporo and Enugu shales have TOC contents of 1.35–3.51 wt.% and HI values between 22 and 65 mg HC/g TOC. The Tmax and vitrinite reflectance values obtained on the coals indicate immature to early mature stages (early oil window) for successions in the basin. A corresponding HI-Tmax based on the values given by Peters (1986) indicates an oil and gas generative potential for some of the samples from the Anambra basin. Gas chromatography and gas chromatography–mass spectrometry analyses indicates high inputs of terrestrial humic/ higher plants organic matter as well as maturity levels below the conventional beginning of oil generation (Ro 0.6%).

Middle Benue Trough

In the middle Benue trough, TOC contents of as much as 79.1 wt.% and a mean HI value of 281 mg HC/g TOC characterize the coals of the Awgu Formation. Tmax and Ro values indicate maturity in the peak to late oil window. A corresponding HI-Tmax indicates potentials in the oil and gas phase and a gas phase for some of the coal samples from the middle Benue trough.

Chromatograms and mass fragmentograms result indicates that organic matter was contributed from both algal and terrestrial higher plant sources or is in an advanced stage of maturity.

Upper Benue Trough

The formations from the upper Benue trough have generally low TOC and HI values, except the coals of the Lamja Formation (LAMCO) and those from Doho and Gombe (UBDJ, MGMC) in the Gombe Sandstone as well as some Dukul Formation samples, all of which have good to fair source rock qualities. In the Lamja Formation, TOC contents attain values of as much as 51.1 wt.% and a mean HI of 183 mg HC/g TOC for the coals in the upper Benue combined. Ro and Tmax values indicate maturity in the middle/ peak oil window for the coals of the Lamja Formation. Unfortunately, samples from the Bima, Yolde, Pindiga, and Gongila formations yielded poor source rock quality. A corresponding HI-Tmax indicates some potential between oil and gas, with gas dominating the majority. Most of the samples fall into fields that have no hydrocarbon-generative potential but the Lamja and Gombe coals are of special interest, especially the Lamja, which yielded the highest amount of soluble organic matter during solvent extraction. Biomarkers show abruptly changing depositional Conditions with maturity level of 0.70–0.73% Ro.

Chad Basin

Eighty percent of the shale samples from the Chad basin have TOC values >0.5 wt.%, the minimum limit for hydrocarbon generation. The HI values all indicate gas-prone type III organic matter with possibilities to generate gaseous hydrocarbons when juxtaposed against the Tmax. S2 vs. TOC plots gave an average HI of 148 mg HC/g TOC in source rocks from the Nigerian National Petroleum Corporation Ziye-1 well, indicating a possible oil-generating potential (oil was not discovered in this well, but there is such a possibility in prospects that have source rocks co-relatable to those in the Ziye-1 well. Biomarkers show a dominance of short-chain n-alkanes with no obvious odd-over-even predominance and are very similar to what an oil show or oil sample would look like.

Mid Niger Basin

Although TOC values and liptinite contents are relatively high in the Mid-Niger basin samples, the Tmax values and Ts/Tm and moretane/hopane ratios are indicative that hydrocarbons of mainly gaseous composition are probably just being generated in the basin and may not

yet have been expelled nor migrated in large quantities. However, it is important to note at this stage that some hydrocarbon seepages have been reported along the bank of River Niger around Pategi and Mokwa in the Niger State of Nigeria (Shekwolo, 2001).

Remarks on petroleum potentials

The Geochemical result for five out of six Inland basins of Nigeria presented above is sufficient enough to serve as a guide for a more rigorous/advance search for commercial quantity hydrocarbon in that region since the buildup of any prospect or of petroleum system requires the availability of good-quality source rocks. Additionally, the stratigraphic position of the source rocks, the availability of good-quality reservoir and seal lithologies, timing of hydrocarbon generation, favorable regional migration pathways, and trapping mechanisms must also be considered. Obae, Wehner, Abubakar and Isah established the existence of good quality reservoir rocks and sealing lithologies in these basins.

Apart from the Chad basin samples, all other results presented by this study were obtained from sample outcrops and some shallow boreholes. Outcrop samples, having undergone many exogenic transformations (weathering, contaminations, and anthropogeny), may not have yielded very reliable source Rock-Eval data, but being the only types of samples available for study in this region at the moment, they nevertheless have constituted preliminary useful data. We recommend that a deep research well be drilled in each sector of Nigeria's inland basins to furnish a better understanding of the stratigraphy, sedimentology, and geochemistry of the yet chiefly un-penetrated deeper sections.

Investment Environment

Relevant state agencies and their roles;

Under the Nigerian Constitution, all minerals, mineral oils and natural gas in Nigeria is vested in the Government of the Federation for the benefit of all Nigerians (Nigeria's Constitution, 1999). Petroleum operations and activities are regulated primarily by federal agencies, although some state governments and local governments also have regulations and bye-laws that affect activities in the Oil and Gas Industry

The principal government agencies responsible for petroleum matters are;

- (1) The Ministry of Petroleum Resources ("MOP"),
- (2) The Department of Petroleum Resources. ("DPR"),
- (3) The Nigerian National Petroleum Corporation ("NNPC"),
- (4) The Federal Ministry of Environment ("FMENV"),
- (5) The Federal Inland Revenue Service ("FIRS") and The Ministry of Niger delta ("FMND").

Ministry of Petroleum Resources

The Ministry of Petroleum resources has overall responsibility for the regulation and supervision of the Petroleum Industry. The Ministry is also responsible for the formulation, implementation and coordination of government policy for the sector. The Minister of Petroleum who is the head of the Ministry enjoys a special status and has wide powers under the petroleum laws and regulations. The Minister is responsible for the issue and execution of the major licenses for operations in the sector such as OPLs and OMLs and his consent is also required for the assignment of licenses. He is assisted by the Minister of State for Petroleum. The Minister also has wide powers under the petroleum legislations to make subsidiary legislation for the regulation of petroleum activities.

DPR

Most of the regulatory functions of the Minister of Petroleum are exercised by the DPR. The DPR is responsible for the day to day regulation of the upstream and downstream sectors of the Petroleum Industry. Its functions include:

- Overseeing the activities of companies engaged in petroleum operations.
- Monitoring and control of oil industry operations to ensure compliance with national goals and policies.
- Enforcement of conservation measures and laws.
- Issuing of permits, licenses, leases and giving authorizations and approvals as required under various petroleum laws governing the whole range of oil and gas administration.

Under the proposed Downstream Gas Act, the regulatory functions of the DPR as it relates to downstream gas activities is to be transferred to a new regulatory body to be established and known as the "Gas Regulatory Commission ("GRC").

NNPC

The NNPC is the National oil company. It is a statutory corporation engaged primarily in commercial activities. Activities of NNPC span through the whole spectrum of the oil and gas value chain, from exploration, to production, refining, transportation, distribution and supply of petroleum. The NNPC sometimes operates directly in petroleum operations (for example, its participation in upstream petroleum arrangements with international oil companies) and sometimes indirectly through subsidiaries. One of the more prominent subsidiaries is the Nigerian Petroleum Development Company ("NPDC") which is engaged in petroleum exploration and production. Another well-known subsi-

diary is the Petroleum Products Marketing Company Limited ("PPMC"). The PPMC is responsible for the transportation of crude oil to the refineries and the transportation of petroleum products to depots located in various parts of Nigeria. Another important arm of the NNPC is the National Petroleum Investment Management Services ("NAPIMS"). The NAPIMS is responsible for overseeing the investments of the Federal Government of Nigeria in upstream petroleum operations conducted under joint ventures, production sharing contracts and other petroleum arrangements with the international oil companies ("IOCs").

FMENV

The Federal Ministry of Environment is responsible for the initiation and development of policies for the environment in general. In conjunction with the DPR, it is also responsible for the regulation and administration of environmental standards and regulation for the Oil and Gas Industry. The Federal Ministry of Environment is also responsible in conjunction with the DPR for conducting any necessary environmental impact assessment ("EIA") and issuing the necessary approvals for projects that are subject to EIA.

FIRS

The Federal Inland Revenue Service ("FIRS") is responsible for the assessment, collection and administration of all federal taxes. The taxes include petroleum profits tax, company's income tax, capital gains tax, education tax and value added tax.

FMND

The Federal Ministry of Niger Delta ("FMND") is the corporation established to formulate Policies & Guidelines, and to develop and implement projects & programs for the development of the Niger-Delta area where most of Nigeria's crude oil is produced. Oil producing companies and gas processing companies are required by law to contribute 3% of their annual budget to the NDDC fund which is a subsidiary of the ministry. There are other governmental agencies at federal, state and local government levels that regulate certain aspects of petroleum operations and activities.

Lease Administration

Types of licenses

As previously stated, the Nigerian Constitution provides

that the entire property in and control of all minerals, mineral oils and natural gas in, under or upon any land in Nigeria or in, under or upon the territorial waters and the Exclusive Economic Zone of Nigeria shall vest in the Government of the Federation and shall be managed in such manner as may be prescribed by the National Assembly (Nigeria's Constitution, 1999). The Petroleum Act provides for 3 types of licenses for upstream operations: Oil Exploration License ("OEL"), Oil Prospecting License ("OPL") and Oil Mining Lease ("OML").

In practice, OEL's are no longer issued, so the OEL will not be discussed in this article. Only citizens of Nigeria and companies incorporated in Nigeria can be granted an OPL or OML or allowed to hold or acquire any interest in the license or lease. Nigerian Company Law does not permit branch operations. As such, any foreign company that intends to do business in Nigeria or to hold any interest in an OPL or OML is required by law to establish a subsidiary or affiliate company in Nigeria for that purpose (Ola, 1984). An OPL confers on the grantee the exclusive right to conduct petroleum operations in the OPL area and to produce and dispose of the produced hydrocarbons. The duration of an OPL for onshore areas and shallow waters is 5 years, inclusive of any period of renewal, while the duration of an OPL for Deep Offshore and Inland Basins is 10 years. An OML confers on the grantee the exclusive right to search for, win, work, carry away and dispose of all petroleum in, under or throughout the area covered by the OML. An OML confers essentially the same rights as an OPL but the duration of an OML is 20 years and may be renewed for a further period of 20 years. The applicant for an OML must be a holder of an OPL who has discovered crude oil in commercial quantity. Commercial quantity is deemed to have been achieved if the OPL holder can satisfy the authorities that a production of 10,000 barrels per day of crude oil can be obtained from the OPL area. Unlike what obtains in some other jurisdictions, there is no special prospecting license or mining lease for Gas. The rights granted to the holder of an OPL or OML apply both to Oil as well as Gas.

Types of petroleum arrangements

Upstream Operations

There are broadly speaking, three types of petroleum arrangements in the Nigerian upstream oil and gas sector:

- Concessions
- Joint Ventures
- Production Sharing Contracts

Concessions

The earliest form of petroleum arrangement in Nigeria is the Concession arrangement. Under this arrangement an oil company is granted an Oil Prospecting License ("OPL") and on discovery of petroleum in commercial quantity, the company is granted an Oil Mining Lease ("OML").

The oil company conducts petroleum operations on its own, subject of course, to regulations by the appropriate authorities and pays royalties and petroleum profit tax ("PPT") to the government. This was the arrangement operating in Nigeria prior to the 1960s and 1970s when the Nigerian Government through the NNPC acquired participating interests in the various concessions thereby converting the concessions to joint ventures. The concession arrangement still operates in relation to oil blocks allocated to indigenous companies. The letter of allocation ("concession letter") typically contains a provision which reserves a right to the government to acquire a participating interest in the block upon conversion to an OML. The concession letter also provides that the indigenous company cannot assign more than 40% of its interest to an IOC (i.e. a company owned wholly or partially owned by an IOC.) With regard to deep offshore blocks, the Deep Water Block allocations to companies (Back-in-rights) Regulations provide among other things that the government can acquire 5/6 of the indigenous party's interest in a Deep Offshore OPL or OML. An exercise by the government of its back-in-rights will convert such concessions to joint ventures. The interest acquired by the federal government will be held and administered by NNPC.

Joint Ventures

The term "Joint Venture" ("JVs") is used commonly to describe the arrangements between the government and IOCs whereby both parties provide funding for the exploration, development and production of petroleum, and the hydrocarbons produced is shared in proportion to each party's participating interest. This arrangement is typically governed by a Joint Operating Agreement ("JOA") between NNPC and the IOCs, providing for the conduct of petroleum operations. The IOC is typically the operator with a management committee established to supervise operations. The project is funded through cash calls on each of the parties. This was the petroleum arrangement adopted in the 1960s and the 70s when OPEC countries decided to acquire participating interests in petroleum operations in their countries. These Joint Ventures have come under severe funding pressure due to the increasing cost of funding the JV operations which is put at about USD15.2 billion for year 2008 and NNPC's inability to fund its share of the cost which is put at about USD8.7 billion. NNPC have had to enter into

alternative funding arrangements (similar to the PSC arrangements) for the funding of some of the JVs. There are also joint ventures involving only private investors. These joint ventures are usually created when an indigenous company which has obtained a concession from the government farms out an interest to another investor, typically an IOC.

Production Sharing Contracts

As a result of increasing funding pressure from the JVs, the government in 1993 adopted the production sharing contract as the preferred petroleum arrangement with IOCs. Apart from awards restricted exclusively to indigenous companies, all awards for upstream operations are now made on the PSC basis. Under the PSC arrangement, the OPL and on conversion, the OML is held by NNPC. NNPC then engages the IOC or indigenous private investor as Contractor to conduct petroleum operations on behalf of itself and NNPC. The Contractor is responsible for financing all the costs of the various stages of petroleum operations, i.e. exploration, development and production. If the exploration is successful, the Contractor will be entitled to recover its costs together with reasonable profit on commencement of commercial production. If the operation is not successful, then the Contractor will bear all the losses. Upon commencement of production, a portion of the available crude oil is allocated to the Contractor towards the reimbursement of operating costs ("Cost Oil") while a portion of the available crude oil ("Royalty Oil") is allocated to NNPC for the payment of the royalties due and other concession rentals to the government. A portion is also allocated to NNPC for the payment of the petroleum profit tax due from the operations ("Tax Oil"). The balance of available crude oil after deducting Cost Oil, Royalty Oil and Tax Oil ("Profit Oil") is then shared between NNPC and the Contractor in the proportion set out in the PSC. The ratio or formula for the sharing of Profit oil varies from one model contract to the other. There are presently about 5 PSC model contracts operating in Nigeria.

The first generation of PSCs was signed in 1993. The second generation was the 2001 model contracts which were signed following the 2000 licensing rounds. Following the exercise by the government of its back-in-rights in a deep offshore block, NNPC also introduced a 2004 model PSC. The fourth is the model PSC for the Nigeria/Sao Tome Joint Development Zone (JDZ). The fifth is the 2005 model PSC which was introduced during the 2005 licensing round. The principles in the PSCs remain largely the same while the sharing formula for Profit Oil and other provisions vary in detail. The government has also developed a draft Gas Development Agreement for upstream gas projects and is currently discussing the draft with stakeholders.

Downstream Operations

The arrangements described above apply essentially to upstream operations. The Nigerian downstream petroleum sector is not as developed as the upstream, as most of the operations apart from the NLNG and a few other Projects are operated by the government as a monopoly. The Bureau for Public Enterprises ("BPE"), the government agency responsible for privatization has already commenced the process for the privatization of most of the government-owned companies operating in the downstream sector. A proposed Downstream Gas Act to regulate the downstream gas sector has been developed with assistance from the World Bank.

Most of the current projects in the downstream sector are either organized as a corporate joint venture such as the NLNG or an unincorporated joint venture such as the NNPC/Mobil NGL Project.

Investor protection

The Nigerian Investment Promotion Commission Act ("NIPC Act") provides several protections for foreign investors in Nigeria. Section 24 of the NIPC Act 1995, provides that a foreign investor in an enterprise to which the Act applies shall be guaranteed unconditional transferability of funds through an authorized dealer, in freely convertible currency, of:

- dividends or profit (net of taxes) attributable to the investment,
- payments in respect of loan servicing where a foreign loan has been obtained, and
- Remittance of proceeds (net of all taxes) and other obligations in the event of a sale or liquidation of the enterprise or any interest attributable to the investment. The NIPC Act also provides assurances and protection against expropriation. Section 25 of the NIPC Act provides that:
 - a. No enterprise shall be nationalized or expropriated by any government of the federation,
 - b. No person who owns, whether wholly or in part, the capital of any enterprise shall be compelled by law to surrender his interest in the capital to any other person.

The NIPC Act further provides that where there is a dispute between an investor and the government, the dispute can be resolved by any means agreed between the parties, or as provided in any applicable bilateral or multilateral agreement. If the investor and the federal government do not agree on the method of dispute settlement, the dispute will be resolved in accordance with the rules of the International Centre for Settlement of Investment Disputes ("ICSID"). It should be noted that Nigeria is a signatory to the convention establishing the ICSID ("ICSID Convention"). Nigeria has also signed bilateral investment protection treaties with several

countries which provide additional protection to the nationals of and companies with headquarters in those countries.

CONCLUSIONS

The aim of this paper is to examine the potential investment opportunities that lie in the underexplored inland basin of Nigeria where commercial hydrocarbon accumulations have recently been discovered in Chad, Niger and Sudan which lie on the same rift trend. Although minimum exploration has been carried out owing to the large abundance of oil in the Niger Delta, it is however evident based on the available biomarker spectra which constitute an important data bank that can be used to trace the source rock for whatever hydrocarbon (oil and/or gas) that may be discovered, that Nigeria's inland basins have great potential for hydrocarbon production.

China National Petroleum corporation exploration program in Niger republic, Chad republic and Sudan republic was a classical textbook example of a successful drilling campaign, from concept to exploration and development, in an untested, remote, high-risk, and high-cost area. With relentless and rejuvenated geological and geophysical studies, particularly with respect to the evaluation of potential petroleum systems, commercial success may also be achieved in the Nigeria's inland basins.

While ensuring an accommodating environment, Nigerian Government has recently been calling on investors for exploratory activities in its inland basins in order to attain higher reserves from the current 2.8 million barrel per day to 4.0 million barrel per day. It is thus imperative for potential investors to seek this new market and supply the continuous growing demand for hydrocarbon based energy.

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