Earth observations in support of fisheries management in West Africa

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University of Ghana

Contributions from G Wiafe, B Foli, I Williams

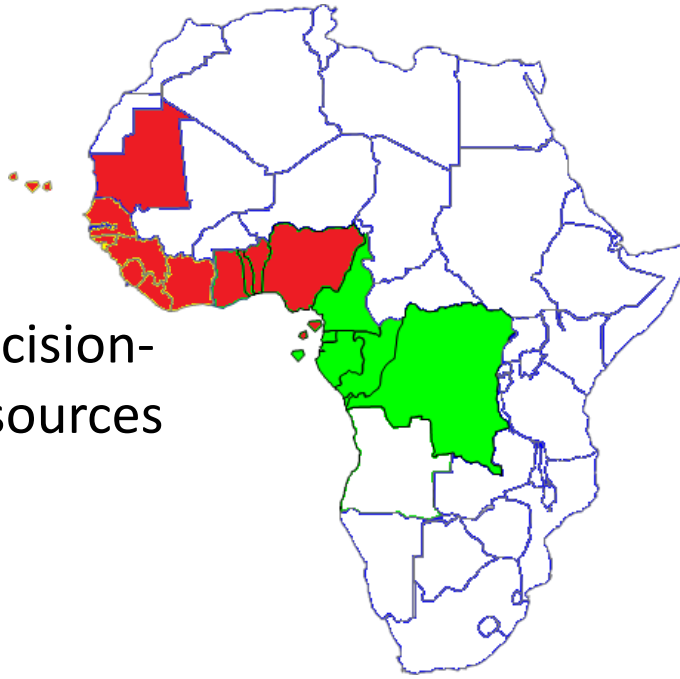
Session 5: Services and Information for Healthy Ecosystems and Food Security

MESA
Monitoring for Environment and Security in Africa
ECOWAS Coastal & Marine Resources Management Centre
Financed by 10th European Development Fund

- **Outline**
  - Introduction of the MESA ECOWAS Marine Thema
  - Description of MESA Marine Services
  - Benefits of the use marine EO data for the management of fisheries in West Africa
    - Mapping potential fishing zones
    - Early warning of ocean conditions
    - Fishing vessel traffic
  - Near term needs in the region
    - Improved monitoring including the activities of small fishing vessels

MESA (Marine) in ECOWAS Region

- **Theme**
  - Earth observation services for coastal and marine resources management in ECOWAS



- **Objective**
  - To increase the information management, decision-making & planning for coastal and marine resources management, by enhancing access to and exploitation of Earth Observation data.

MESA Regional Thematic Actions

THEME : «Crop and rangeland management»

RIC : Cilss, Agrhymet Niamey

THEME Marine & Coastal management
RIC: University of Ghana

THEME : « Integrated Water Resource Management »

RIC : Cicos, Kinshasa, RDC

THEME : «Agricultural & Environem ressource management»

RIC : NMS Gaborone, Botswana

ECOWAS

1.Benin
2. Cape Verde
3. Cote d'ivoire
4. Gambia
5. Ghana
6. Guinea
7. Guinea Bissau
8. Liberia
9. Nigeria
10. Senegal
11. Sierra Leone
12. Togo
13. Mauritania
14. Sao Tome & Principe

CEMAC

- Cameroon
- Equatorial Guinea
- Gabon
- R. Congo
- DR Congo

MES
Monitoring for Enviro
and Security in Af

Fisheries Challenges in Gulf of Guinea

- 3 million: People directly or indirectly **employed** in fishing industry
- 20 kg: Avg. annual per capita consumption of fish **protein** for the region (World: 18 kg: Avg)
- 1.6 Million tons of **catch** per year (about $3 billion)
- $1.5 Billion: Value of **lost** fishing revenue due to IUU
- 10% of **GDP** in Guinea-Bissau and Sierra Leone from fishing industry
- >30% of **export** revenues in fish (Mauritania & Senegal)

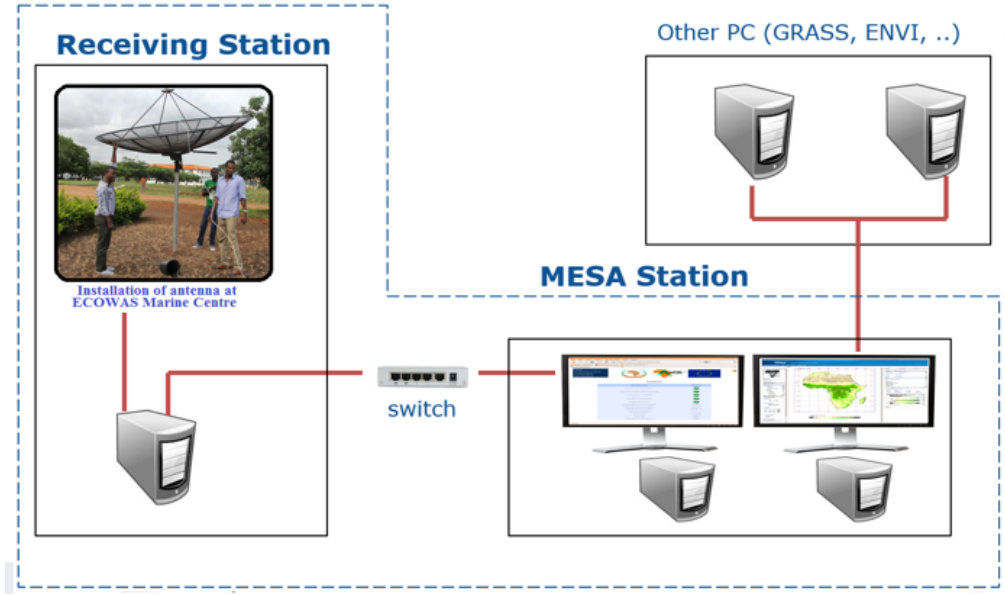
- ***Source:*** *Illegal Fishing Plunders and Strains West Africa (http://www.reuters.com/article/2012/03/15/us-westafrica-fishing-idUSBRE82E0HD20120315); Governance in West African Fisheries. Experiences from the West African Regional Fisheries Program*
- *(http://www.lib.noaa.gov/about/news/Virdin_07112012.pdf)*

MESA (Marine) in ECOWAS Region

- Establishment of Regional Centre
  - *ECOWAS Coastal & Marine Resources Management Centre (located at University of Ghana)*
- Designation of National Focal Points
  - *Benin, Cape Verde, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Nigeria, Senegal, Sierra Leone, Togo, Mauritania, Sao Tome and Principe*
- Partnership with National Research centres and universities
  - *Nigerian Institute for Oceanographic and Marine Research (NIOMR)*
  - *Ghana Meteorological Agency (G-MET)*
  - *Centre de Recherches Océanographiques de Dakar (CRODT)*
  - *Institut National de Développement des Pêches (INDP)*
  - *University Félix Houphouët-Boigny (Cocody), Cote D'Ivoire*
  - *University of Abomey-Calavi, Benin Oceanologic and Fisheries Research Institute (IRHOB) Benin*
  - *University of Sierra Leone, Fourah Bay, Sierra Leone*

5 Result Areas of MESA

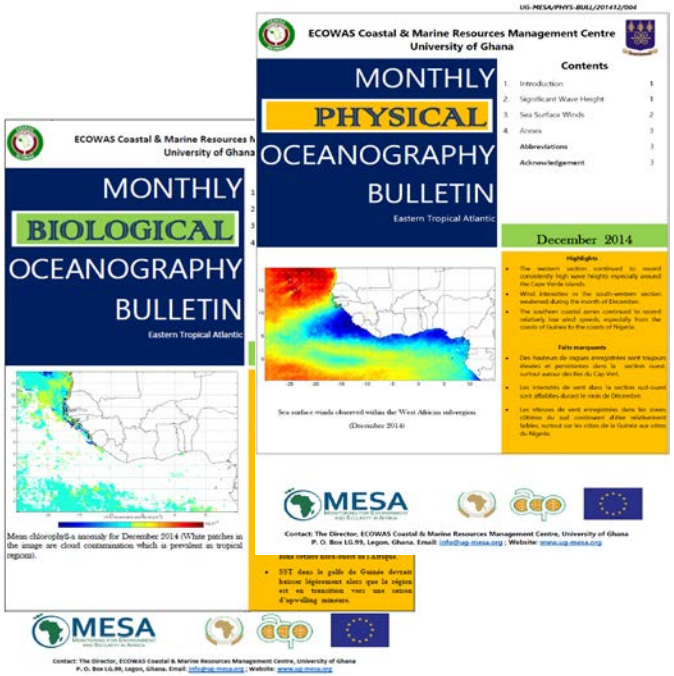
1. Provide Access to EO data



21 MESA Stations are to be installed in participating institutions

5 Result Areas of MESA

2. Develop EO Services



Monthly Environmental Bulletins

Monitoring potential fishing zones in western Africa

Safety of artisanal fishermen at sea

5 Result Areas of MESA

3. Building Capacity in EO data analyses

- Regional training
- National training
- Open & targeted fellowships
- Internships
- Trainer of Trainers programmes (Continental level)

5 Result Areas of MESA

4. Utilize EO data to support decision / policy formulation

- **Regional Fisheries Directors Forum**
  - **harmonization of legal framework for monitoring small fishing vessels**
- **Regional Working Committees**
  - **guidance on prioritizing key services required for the sustainable management of fisheries resources**

5 Result Areas of MESA

5. Building synergies with organizations within and outside MESA

Collaboration with:

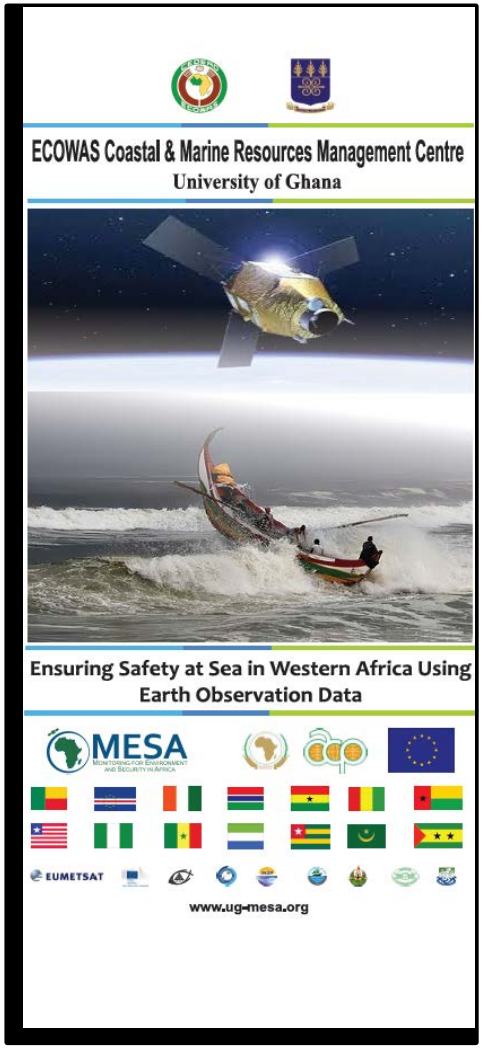
MOI, AGRHYMET, AWA, PRCM, CICOS, BDMS USAID/UCC

Participating in crossfertilization and continental activities

Marine Products and Services

SERVICE 1:

Forecast of Potential Fishing Zone (PFZ) charts and Monitoring of Fishing Vessel Traffic



SERVICE 2:

Forecast of Ocean conditions and dissemination as SMS alerts

Supporting fisheries management using EO data

Service 1 – Mapping potential fishing zones (PFZ)

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EO for fisheries management

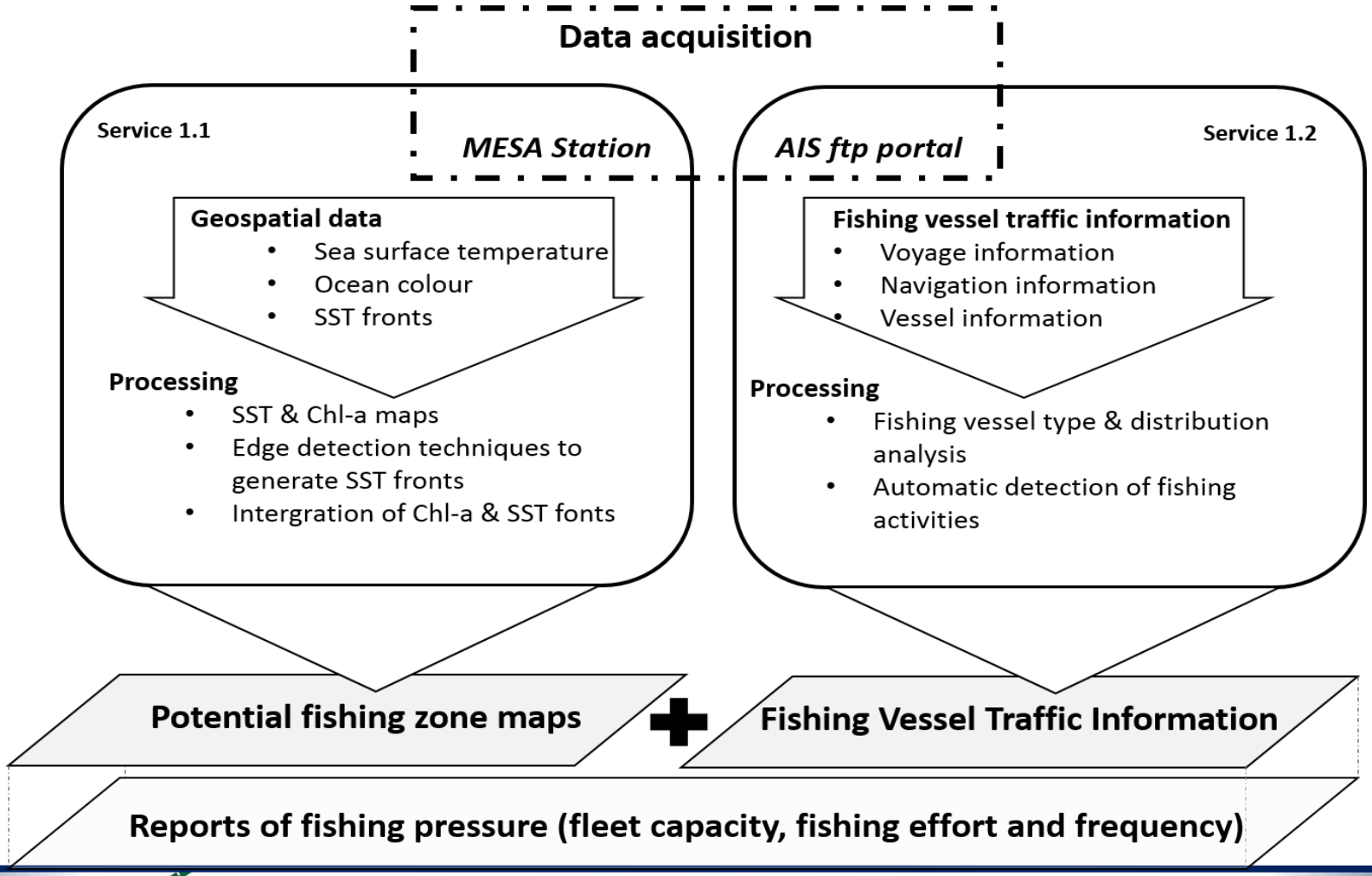
PFZ maps + Automatic Identification System (AIS)

Service 1 - Fisheries management support	
Description	Targeted users
Service 1.1: Maps of potential fishing zones	• Regional Fisheries Bodies • National focal persons (NFPs) in the 14 countries participating in the ECOWAS Marine Thema • Universities, Research and Academic institutions • Community Fishing Groups • Agencies in charge of Monitoring, Control and Surveillance
Service 1.2: Overlay PFZ map with fishing vessel traffic information	

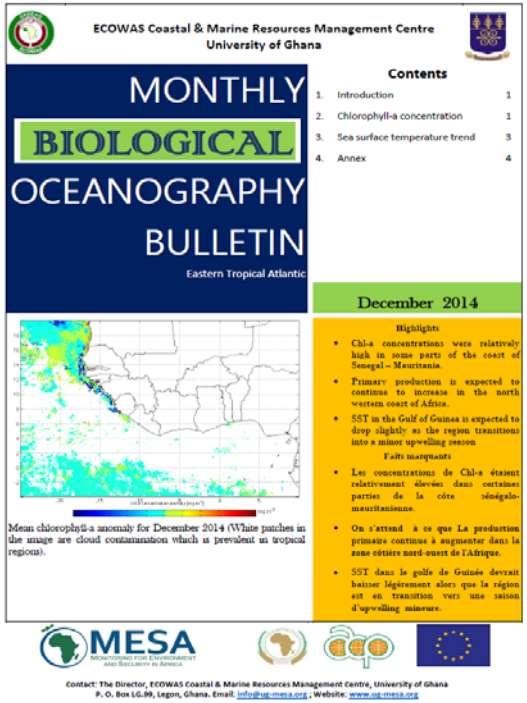
Data:
MODIS OC/SST products, Mercator forecast products [SST, SSH, u-v, SSS],
Automatic Identification System [vessel traffic data]

EO for fisheries management

PFZ maps + Automatic Identification System (AIS)



Service 1 – Mapping potential fishing zones


ECOWAS Coastal & Marine Resources Management Centre
University of Ghana

MONTHLY
BIOLOGICAL
OCEANOGRAPHY
BULLETIN
Eastern Tropical Atlantic

Contents

December 2014

Highlights

- Chl-a concentrations were relatively high in some parts of the coast of Senegal – Mauritania.
- Primary production is expected to continue to increase in the north western coast of Africa.
- SST in the Gulf of Guinea is expected to drop slightly as the region transitions into a minor upwelling season

Faits marquants

- Les concentrations de Chl-a étaient relativement élevées dans certaines parties de la côte sénégalo-mauritanienne.
- On s'attend à ce que La production primaire continue à augmenter dans la zone côtière nord-ouest de l'Afrique.
- SST dans le golfe de Guinée devrait baisser légèrement alors que la région est en transition vers une saison d'upwelling mineure.

Mean chlorophyll-a anomaly for December 2014 (White patches in the image are cloud contamination which is prevalent in tropical regions).

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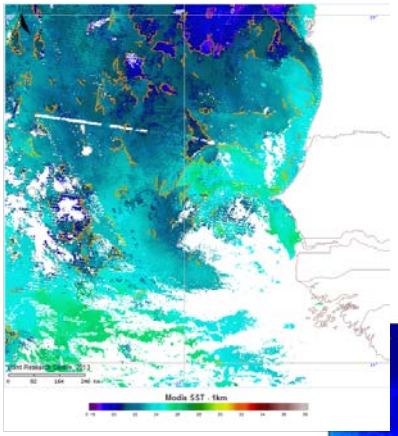
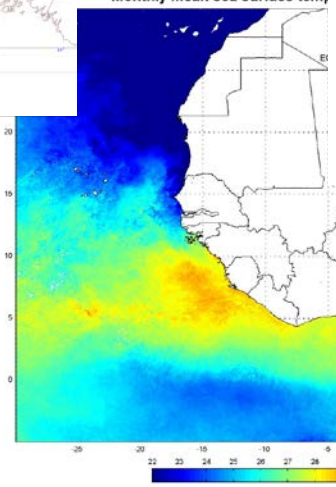
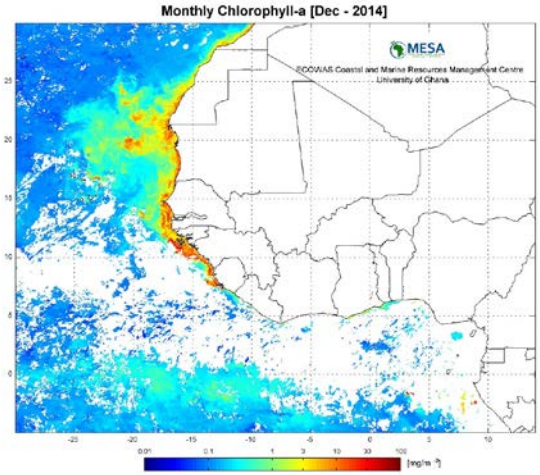
P. O. Box LG.99, Legon, Ghana. Email: info@ug-mesa.org ; Website: www.ug-mesa.org

Monthly Environmental Bulletins

Fronts





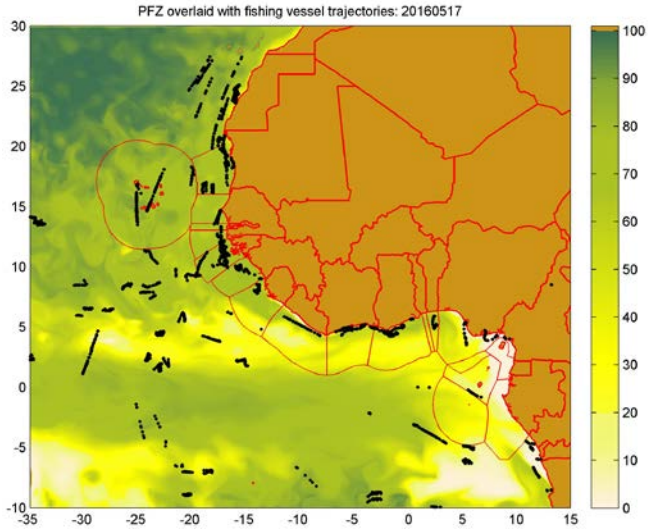


Maps of biological indicators

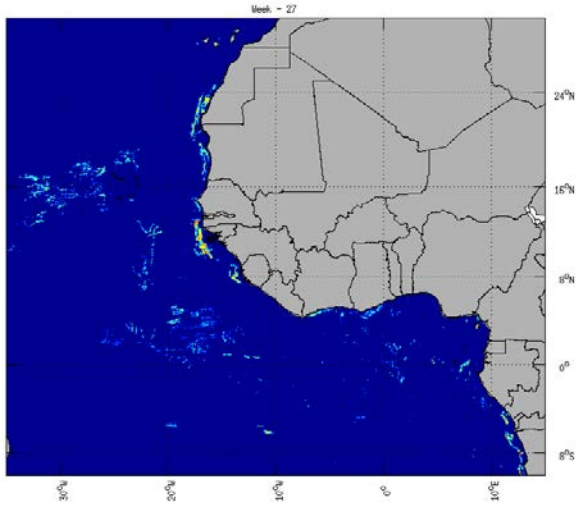
Service 1 – Mapping potential fishing zones

- This service targets **only national institutions involved in monitoring and surveillance** of fishing activities of **INDUSTRIAL FISHING FLEETS**.

- Maps and reports from this service are disseminated via **email, ftp and MESA stations**



PFZ maps overlaid with fishing vessel trajectories to understand fishing behaviour

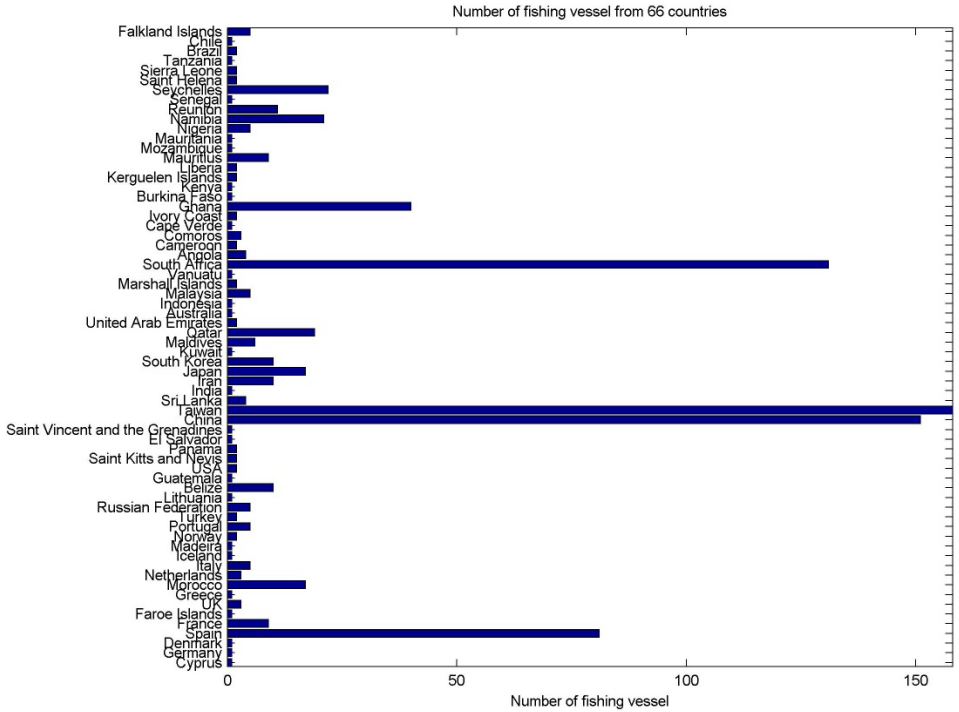


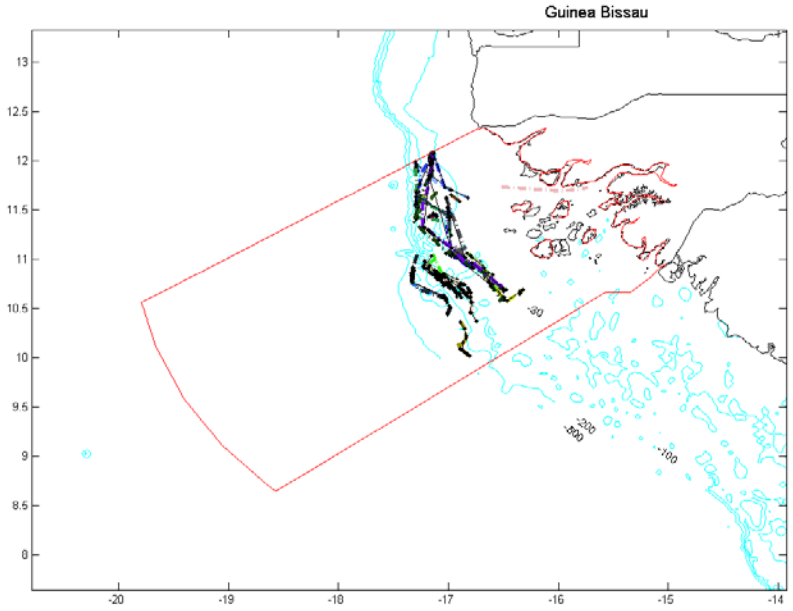
Fishing density maps

Service 1 – Mapping potential fishing zones

- This service targets **only national institutions involved in monitoring and surveillance** of fishing activities.

- Maps and reports from this service are disseminated via **email, ftp and MESA stations**





Fishing vessel monitoring service – Counts of vessels and area fished

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Service 1 – Mapping potential fishing zones

Monitoring illegal unregulated and unreported fishing

- **Daily fishing activity reports** are disseminated daily to institutions with the mandate for monitoring and surveillance of fisheries resources
- **On request reports** to support AIS data analyses and investigate potential IUU fishing activities.

Video of fishing vessel trajectory – evidence of potential IUU fishing

Vessel name:		IMO number:	Call Sign:	Report date
				14-September, 2016
Potential illegal, unregulated and unreported (IUU) fishing				
Exclusive Economic Zone (EEZ)	*Latitude, Longitude*	*Date &Time*	*Estimated duration*	*Remarks*
Ghana	2.8N to 3N, 3W to 2W	29-August, 2016	Approx. 5 hours of fishing	Entered EEZ 0500hrs Fished at two spots , exited on the 30-August, 2016. The fishing vessel is not licensed to fish within the EEZ
Liberia	2N to 4.4N, 7.7W to 9W	1- 4 September, 2016	Approx. 39 hours of fishing	Entered EEZ approximately 0700hrs and fished at numerous spots for 4 days. The fishing vessel is not licensed to fish within the EEZ.

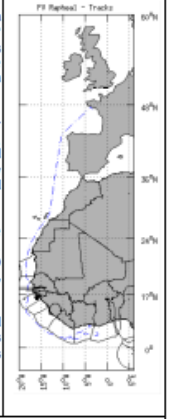
Detailed description of trajectory and fishing activities

[::::]began her journey to tropical Atlantic on 7th August, 2016 from Concarneau from the north western coast of France. She entered the EEZ of Mauritania on the 18th August, 2016 and traveled at a speed between 8.4 to 10.7 knots and southwards (approximately 180deg). Her rate of turn was fairly constant through this period of the journey. These observation suggest that Raphael did not engage in fishing in Mauritania. She exited Mauritania on 19-August, 2016.

[::::]entered the maritime waters of Senegal on the 19th August and berthed in Dakar on the 20th August for only a few hours (9:15 to 11:26 am) after which she began sailing southward. She sailed across Senegal and entered the EEZs of Guinea Bissau and Guinea from 23rd to 24th August at an average speed of 11knots. The rest of the journey westward was done within international waters until 28th August when it entered Liberia's EEZ.

The potential IUU fishing involving [::::]began when it entered Ghana's EEZ on the 29th of August, 2016. Within the EEZ, it is suspected that [::::]fished at two spots with latitudes 2.8N to 3N, and longitudes 3W to 2W. The duration of fishing is estimated to have lasted for 5 hours. The fishing vessel exited Ghana's EEZ on the 30th of August, 2016 to the port in Abidjan where it is suspected to have landed the catch.

[::::]embarked on an another fishing on the 30th August, 2016 at about 1900GMT and headed straight to Liberia's EEZ where it fished approximately for 39 hours (cumulatively). This illegal activity occurred within latitudes 2N to 4.4N, longitudes 7.7W to 9W.



Other remarks:
Video file of vessel trajectory and activities attached

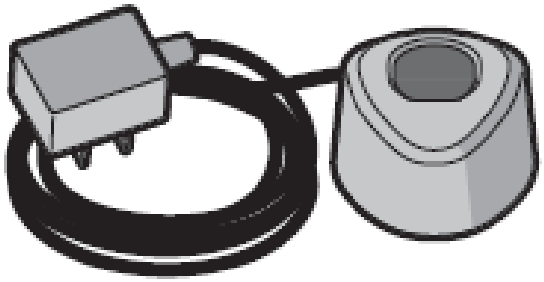
Semi-industrial vessels

They are licensed; 400 operational: exclusively permitted to fish in the Inshore Economic Zone (30m depth); operate from 6 landing sites

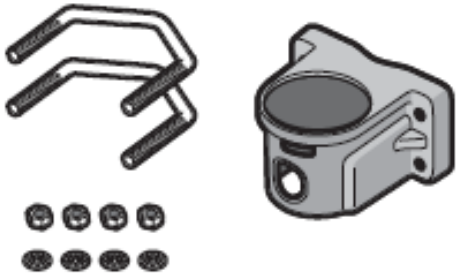
ABSEA transponder

Identifier

Charger



Vessel bracket and fixings



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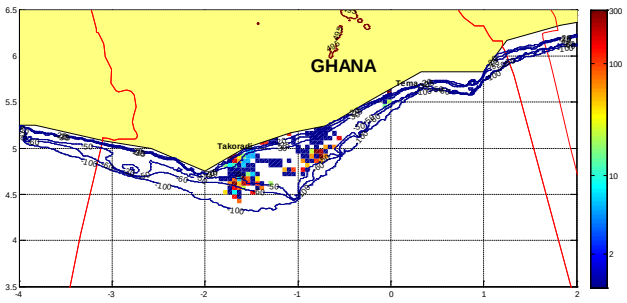
Artisanal vessels

- Open Access; Registered; Not licensed; 9,000 canoes exclusively permitted to the Inshore Economic Zone (30m depth); operate from 308 landing sites

MESA driving policy in West Africa

Demo Project in Ghana with support from ECOWAS Coastal & Marine Res. Mgt. Center collaborated with the Ministry of Fisheries and Aquaculture Development (MFAD) 20 inshore fishing vessels were installed with transponders.

- In Ghana, MFAD has began electronic monitoring of small fishing vessels, about 200 – 400 vessels will be fitted with transponders



Density map – small fishing vessels monitoring, Ghana

Small vessels fitted with transponder

Supporting fisheries management using EO data

Service 2 – Forecasting and monitoring ocean conditions

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Artisanal fishermen in West Africa

- Use small dug-out canoes
- Numbers about 10,000 canoes in Ghana only and about 120,000 in West Africa
- Mainly rely on traditional knowledge to
  - Navigate
  - Locate fish
  - Detect the weather at sea
- Need for an Early Warning System (EWS)


THE AFRICA REPORT

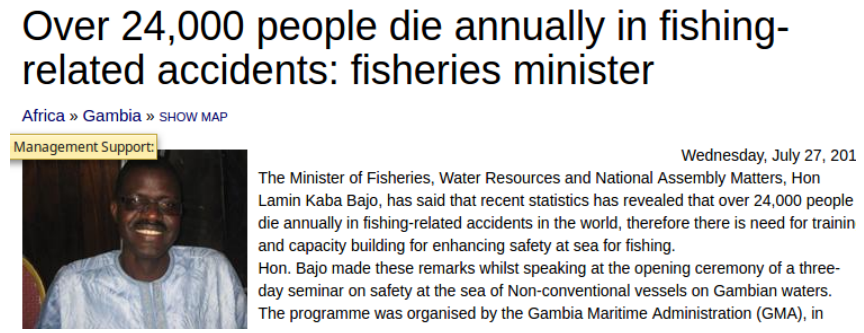
NEWS | IN DEPTH | BUSINESS | POLITICS | ART & LIFE | RANKINGS | COUNTRY FILES | SERVICES

ART & LIFE › SOCIETY › 12 MISSING IN GHANA BOAT ACCIDENT

Posted on Thursday, 08 September 2011 16:58

12 missing in Ghana boat accident

By **Lawrence Quartey**


Over 24,000 people die annually in fishing-related accidents: fisheries minister

Africa » Gambia » SHOW MAP

Management Support:

Wednesday, July 27, 201

The Minister of Fisheries, Water Resources and National Assembly Matters, Hon Lamin Kaba Bajo, has said that recent statistics has revealed that over 24,000 people die annually in fishing-related accidents in the world, therefore there is need for trainin and capacity building for enhancing safety at sea for fishing.

Hon. Bajo made these remarks whilst speaking at the opening ceremony of a three-day seminar on safety at the sea of Non-conventional vessels on Gambian waters. The programme was organised by the Gambia Maritime Administration (GMA), in

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Service 2 – Monitoring and forecasting ocean conditions

Service 2	Title	Goals
Service 2.1	Monitor and forecast ocean conditions	Produce charts of sea surface currents, sea surface height, sea surface temperature and salinity, sea surface winds and significant wave heights for safety at sea.
Service 2.2	Disseminate forecast products via SMS	Make forecast products readily available to users through SMS text messaging.

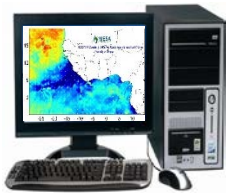
Data:
Wave products, Mercator forecast products [SST, SSH, u-v, SSS]

Service 2: Monitoring and Forecasting Ocean Conditions

Target Users

- Artisanal Fishers
- Semi-industrial and Industrial Fishing Fleet
- Marine Operators
- Navies and Coast Guards
- Fisheries Ministries
- Disaster Management Organizations

Using satellite technology to obtain data on ocean conditions

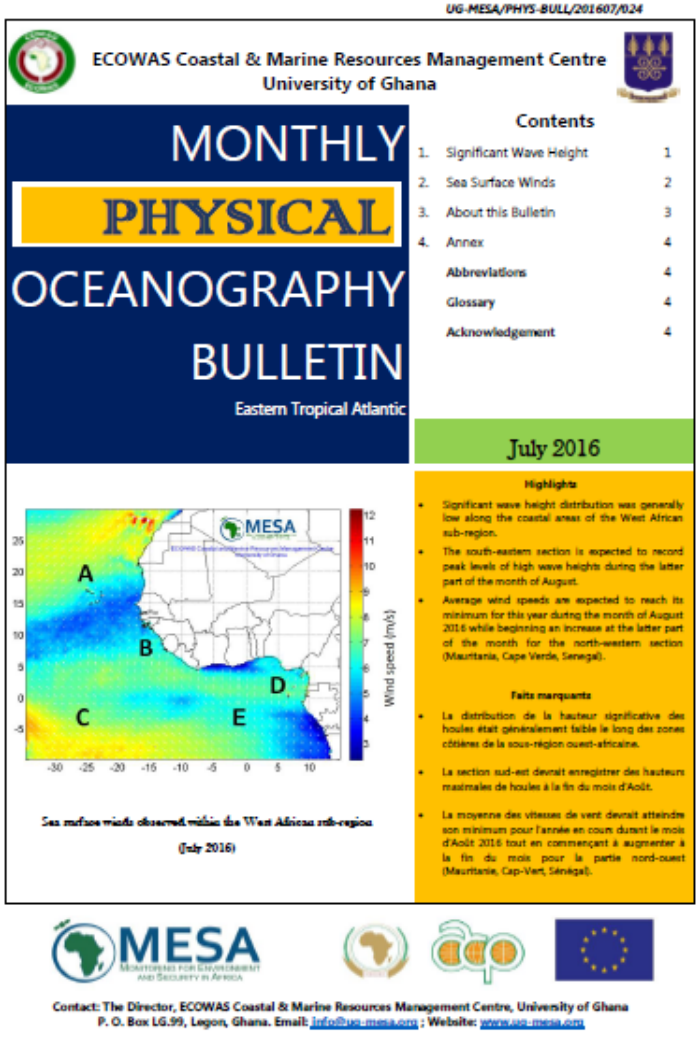


Processing of data and forecasting ocean conditions at sea

SMS messages interpreted with different flags at fishing communities to indicate conditions at sea

SMS alert of Ocean conditions received by artisanal fishermen

Service 2 – Monitoring and forecasting ocean conditions



UG-MESA/PHYS-BULL/201607/024

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MONTHLY
PHYSICAL
OCEANOGRAPHY
BULLETIN
Eastern Tropical Atlantic

Contents

July 2016

Sea surface winds observed within the West African sub-region
(July 2016)

Highlights

- Significant wave height distribution was generally low along the coastal areas of the West African sub-region.
- The south-eastern section is expected to record peak levels of high wave heights during the latter part of the month of August.
- Average wind speeds are expected to reach its minimum for this year during the month of August 2016 while beginning an increase at the latter part of the month for the north-western section (Mauritania, Cape Verde, Senegal).

Faits marquants

- La distribution de la hauteur significative des houles était généralement faible le long des zones côtières de la sous-région ouest-africaine.
- La section sud-est devrait enregistrer des hauteurs maximales de houles à la fin du mois d'Août.
- La moyenne des vitesses de vent devrait atteindre son minimum pour l'année en cours durant le mois d'Août 2016 tout en commençant à augmenter à la fin du mois pour la partie nord-ouest (Mauritanie, Cap-Vert, Sénégal).

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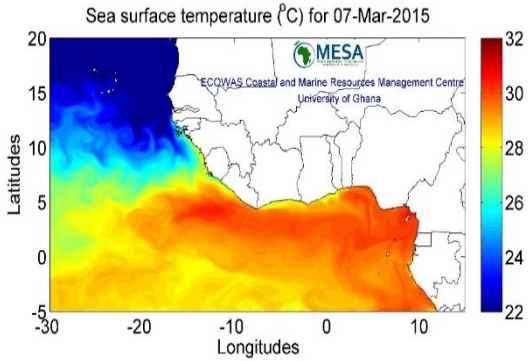
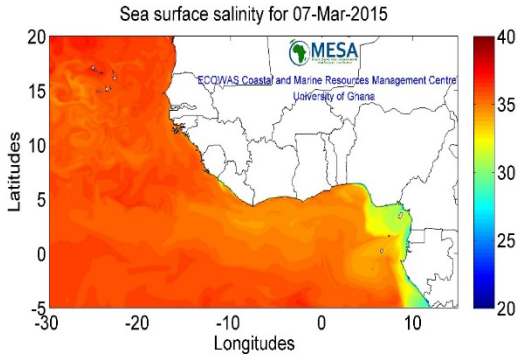
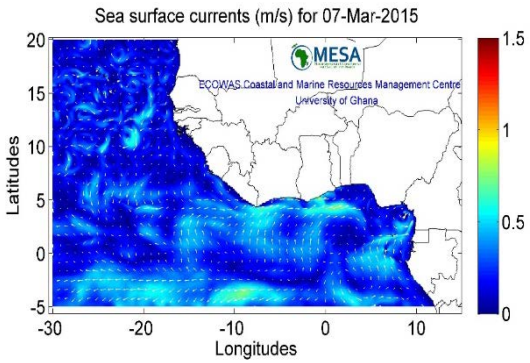
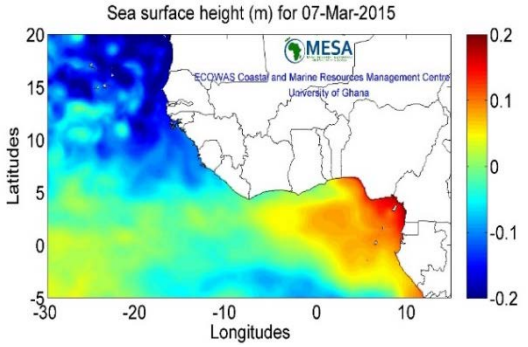
P. O. Box LG.99, Legon, Ghana. Email: info@ug-mesa.org ; Website: www.ug-mesa.org









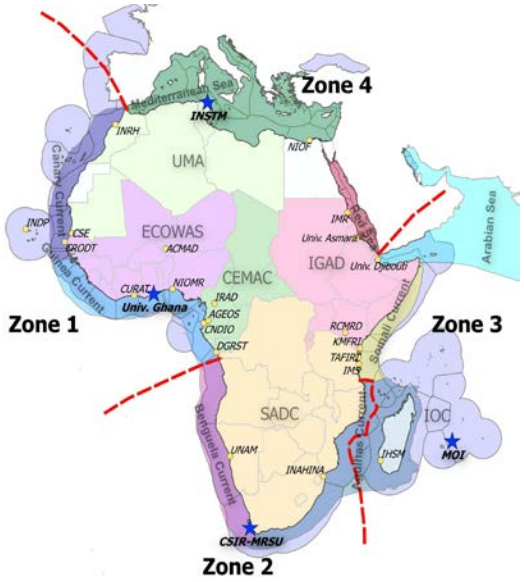
Service 2 – Monitoring and forecasting ocean conditions

Using flags to complement ocean condition dissemination service

GMES-Africa (Future Activities)

FOCUS AREAS:

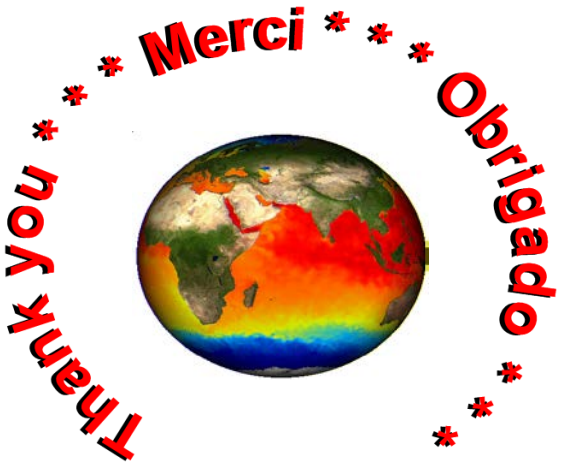
- **Component 1: Monitoring and Forecasting of Oceanography Variables**
  - Monitoring and forecasting of physical and biological oceanography variables (consolidation of MESA application)
  - Potential Fishing Zones Management (consolidation of MESA)
- **Component: Coastal Area Monitoring**
  - Coastal Ecosystems Mapping and Monitoring (new application)
  - Coastal Vulnerability (consolidation of MESA)
- **Component: Ship Traffic and Pollution Monitoring**
  - Ship Traffic Monitoring (new application)
  - Pollution Monitoring and Warning (new application)
- **Component: Marine Weather Forecast**
  - Marine Weather Forecast (consolidation of MESA)

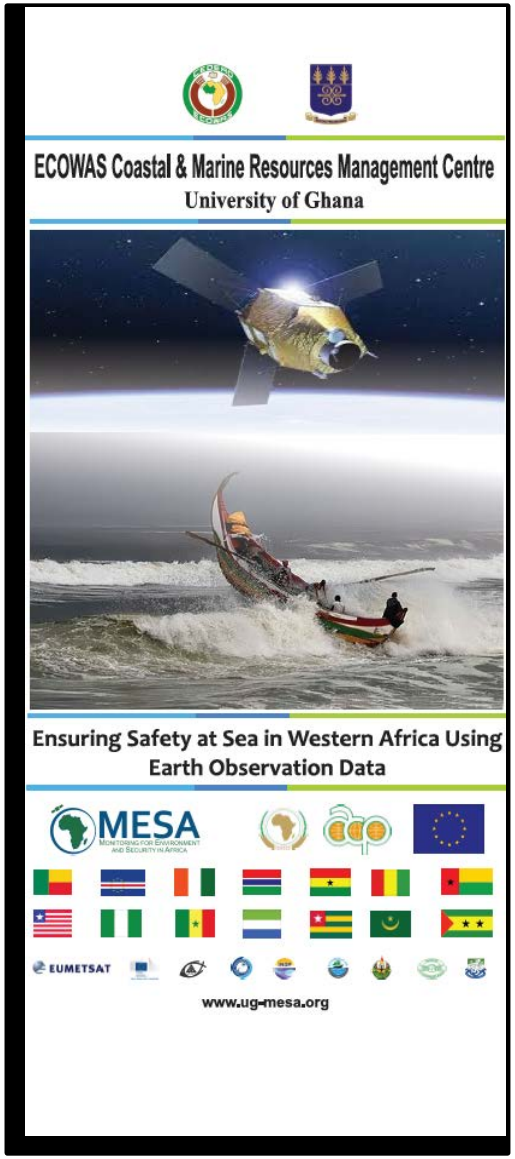


Summary

- Fisheries managers have come to appreciate the huge benefits from using geospatial information in the day-to-day management of fisheries resources
- MESA services are being used in decision-making
  - providing information to artisanal fishermen to ensure safety at sea
  - protecting fishing grounds
- Potential for regional monitoring of smaller fishing vessels
  - Harmonization of legal framework in coastal countries in West Africa.

UG-MESA — protecting fishing grounds and life at sea





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Monitoring for Environment and Security in Africa

ECOWAS Coastal & Marine Resources Management Centre

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