



**Asia-Pacific  
Economic Cooperation**

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**2017/EPWG/SDMOF/011**  
Thematic Session 1.5

## **Decision-Making Support System on Natural Disaster Prevention and Control**

Submitted by: Viet Nam



**11<sup>th</sup> Senior Disaster Management Officials Forum**  
**Vinh City, Viet Nam**  
**21–22 September 2017**



# 11<sup>th</sup> Senior Disaster Management Officials' Forum

Vinh city, Nghe An Province, Vietnam, September, 21 - 22 , 2017

## DECISION-MAKING SUPPORT SYSTEM ON NATURAL DISASTER PREVENTION AND CONTROL (VNDSS)



VIETNAM ACADEMY OF WATER RESOURCES

CENTER FOR WATER RESOURCES SOFTWARE



# 11<sup>th</sup> Senior Disaster Management Officials' Forum

DECISION-MAKING SUPPORT SYSTEM ON NATURAL DISASTER PREVENTION AND CONTROL (VNDSS)

## PLAN FOR DISASTER COPING MEASURES

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## DECISION-MAKING SUPPORT SYSTEM ON NATURAL DISASTER PREVENTION AND CONTROL (VNDSS)

*Identify the affected area by the storm, calculate the forecasted inflow to reservoirs, support users planning flood discharging operational solutions, and predict potential flooded areas*

Ngày dự báo: 16/09/2014 01:00

Mức nước hồ(m): 28.46

Số giờ dự báo: 48 giờ

Lựa chọn kịch bản dự báo mưa: Lũ do bão số 3 ngày 16/9/2014

Lựa chọn kịch bản xả lũ: Xả lũ do bão số 3 ngày 16/9/2014

Thiết lập kịch bản xả tràn: Số tràn mở 3

STT	Thời gian	MN dự báo (m)	Q dự báo (m <sup>3</sup> /s)	Q tràn (m <sup>3</sup> /s)	Tràn 1 (m)	Tràn 2 (m)	Tràn 3 (m)
1	08:00 16/09/2014	28.47	2.25	0	0	0	0
2	09:00 16/09/2014	28.47	2.24	0	0	0	0
3	10:00 16/09/2014	28.47	2.24	6.03	0	0.13	0
4	11:00 16/09/2014	28.45	2.24	67.81	0.5	0.49	0.5
5	12:00 16/09/2014	28.43	2.24	67.68	0.5	0.49	0.5
6	13:00 16/09/2014	28.42	2.24	67.55	0.49	0.5	0.5

Tổng lượng mưa dự báo (mm)

Kịch bản bản đồ ngập lụt hạ du

STT	Thời gian	Lượng mưa Lưu vực(mm)
1	08:00 16/09/2014	0.08
2	09:00 16/09/2014	0
3	10:00 16/09/2014	0

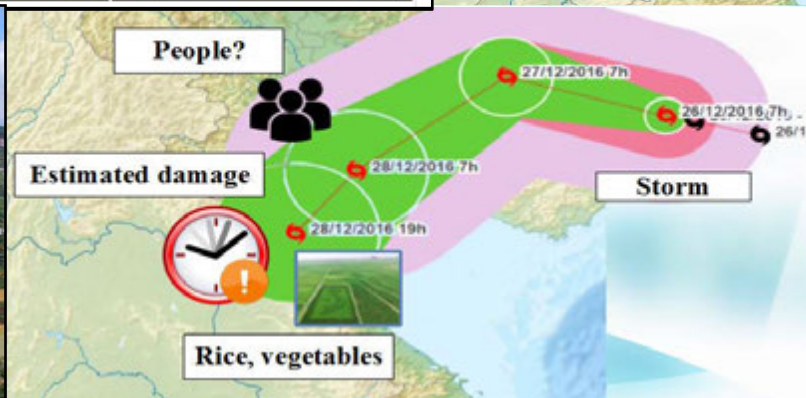
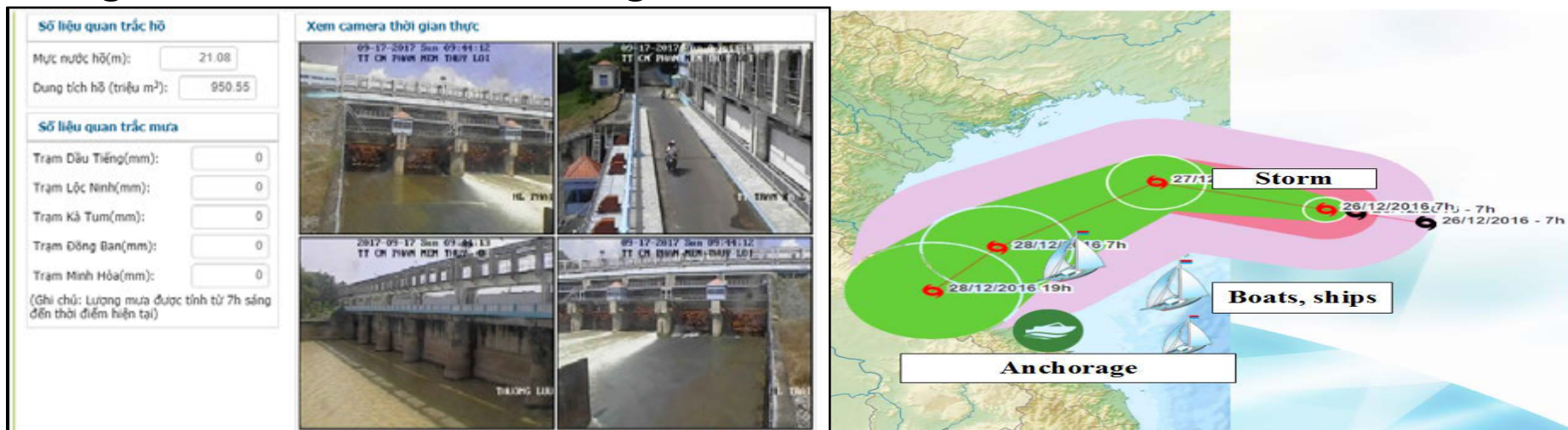
BIỂU ĐỒ DIỄN BIẾN LƯU LƯỢNG ĐẾN HỒ

BIỂU ĐỒ DIỄN BIẾN MỨC NƯỚC HỒ

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## DECISION-MAKING SUPPORT SYSTEM ON NATURAL DISASTER PREVENTION AND CONTROL (VNDSS)

*Number of boats and ships within the affected scope, estimate the damage, display monitoring data and camera images.*





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DECISION-MAKING SUPPORT SYSTEM ON NATURAL DISASTER PREVENTION AND CONTROL (VNDSS)

**SUPPORT DECISION-MAKING IN NATURAL DISASTER  
PREVENTION AND CONTROL**

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## DECISION-MAKING SUPPORT SYSTEM ON NATURAL DISASTER PREVENTION AND CONTROL (VNDSS)

Support users in adjusting reservoirs' flood discharging methods, predict flooded areas from monitored and forecasted data as well as reservoirs' flood discharge plan adjusting solution

Ngày dự báo: 16/09/2014 01:00

Mức nước hồ(m): 28.46

Số giờ dự báo: 48 giờ

Lựa chọn kịch bản dự báo mưa: Lũ do bão số 3 ngày 16/9/2014

Lựa chọn kịch bản xả lũ: Xả lũ do bão số 3 ngày 16/9/2014

Tổng lượng mưa dự báo (mm)  Phân bố

STT	Thời gian	Lượng mưa Lưu vực(mm)
1	08:00 16/09/2014	0.08
2	09:00 16/09/2014	0
3	10:00 16/09/2014	0

BIỂU ĐỒ DIỄN BIẾN LƯU LƯỢNG ĐẾN HỒ

Thì giờ

■ Q đến dự báo(m³/s) ■ Q đến thực đo(m³/s) ■ Q xả(m³/s)

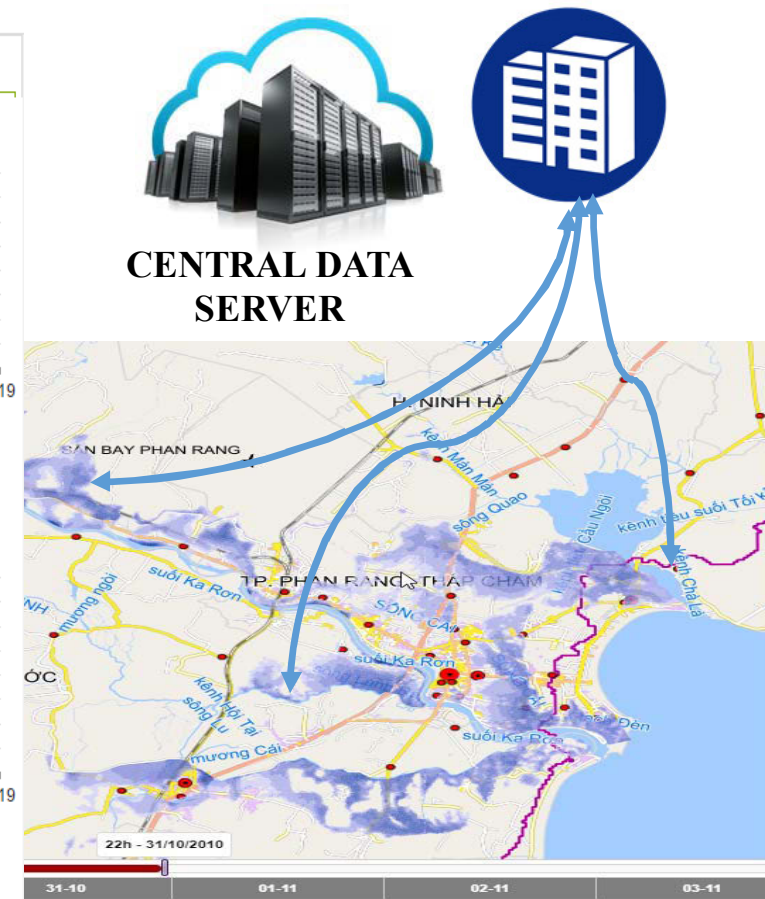
Thiết lập kịch bản xả tràn Số tràn mở 3

STT	Thời gian	MN dự báo (m)	Q dự báo (m³/s)	Q tràn (m³/s)	Tràn 1 (m)	Tràn 2 (m)	Tràn 3 (m)
1	08:00 16/09/2014	28.47	2.25	0	0	0	0
2	09:00 16/09/2014	28.47	2.24	0	0	0	0
3	10:00 16/09/2014	28.47	2.24	6.03	0	0.13	0
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BIỂU ĐỒ DIỄN BIẾN MỨC NƯỚC HỒ

Thì giờ

■ mực dự báo(m) ■ Mực nước thực đo(m) ■ Mực nước dâng bình thường(m)



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Display monitored data, camera images of affected area. Warnings of dangerous positions from monitored data. Estimates of the disaster damages

**Số liệu quan trắc hồ**

Mức nước hồ(m):

Dung tích hồ (triệu m<sup>3</sup>):

**Số liệu quan trắc mưa**

Trạm Dầu Tiếng(mm):

Trạm Lộc Ninh(mm):

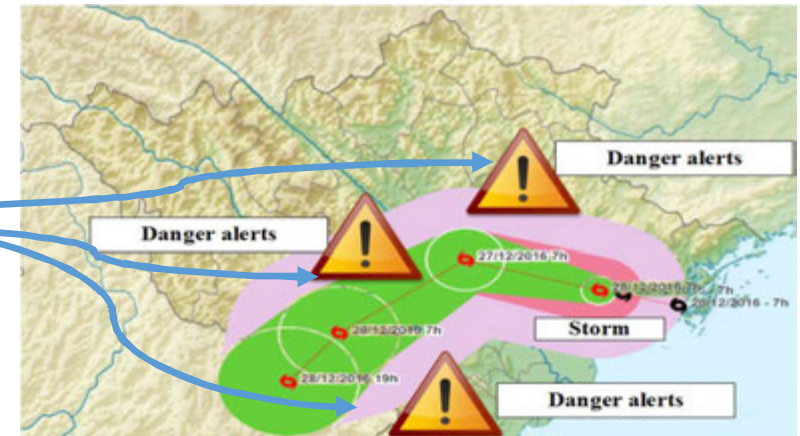
Trạm Kà Tum(mm):

Trạm Đồng Bân(mm):

Trạm Minh Hòa(mm):

(Ghi chú: Lượng mưa được tính từ 7h sáng đến thời điểm hiện tại)

**Xem camera thời gian thực**







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**OVERCOME DISASTERS' AFTERMATH**

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## DECISION-MAKING SUPPORT SYSTEM ON NATURAL DISASTER PREVENTION AND CONTROL (VNDSS)

- Provide statistics on damages of people, houses, vegetables, etc.
- Solutions to overcoming disasters' aftermath





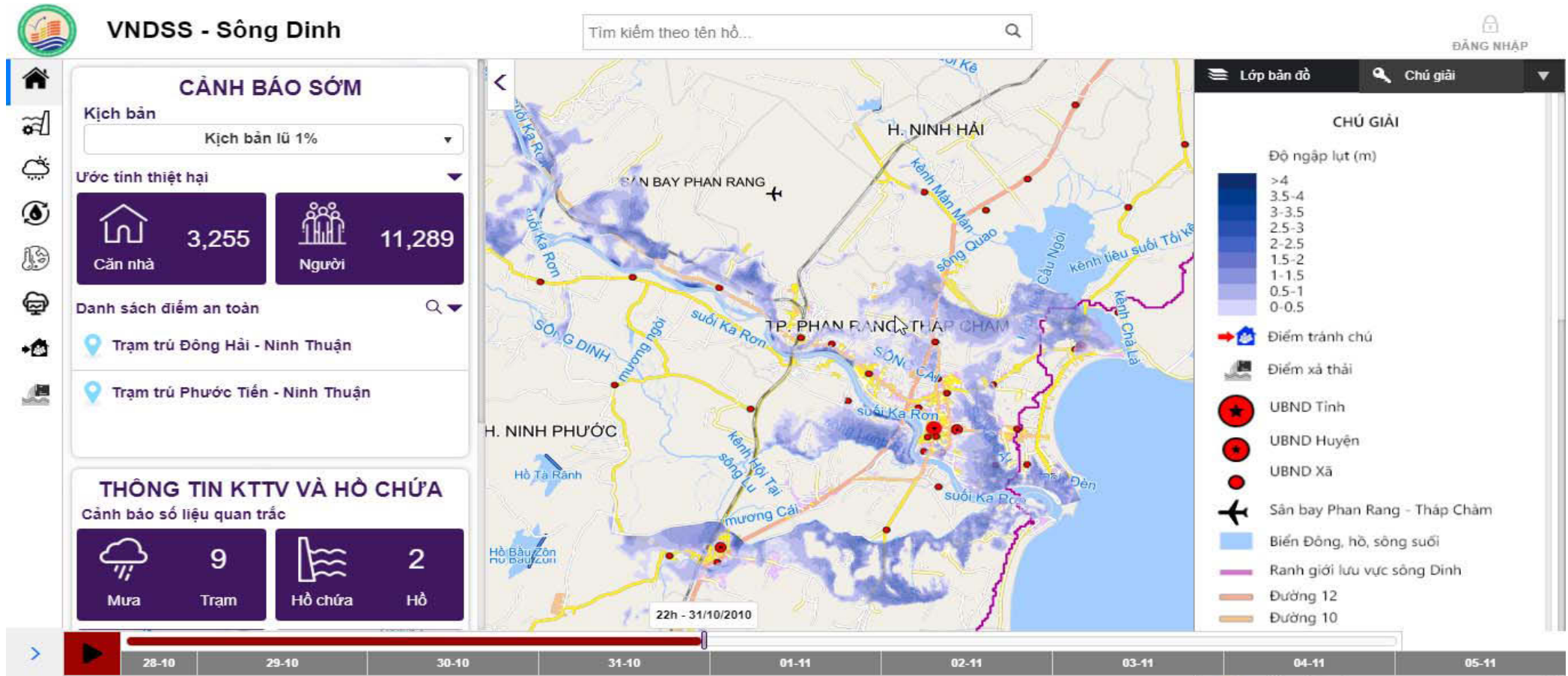
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**DECISION-MAKING SUPPORT SYSTEM ON NATURAL DISASTER PREVENTION AND CONTROL (VNDSS)**

## **IMPLEMENTATION STATUS OF VNDSS SYSTEM IN VIETNAM**

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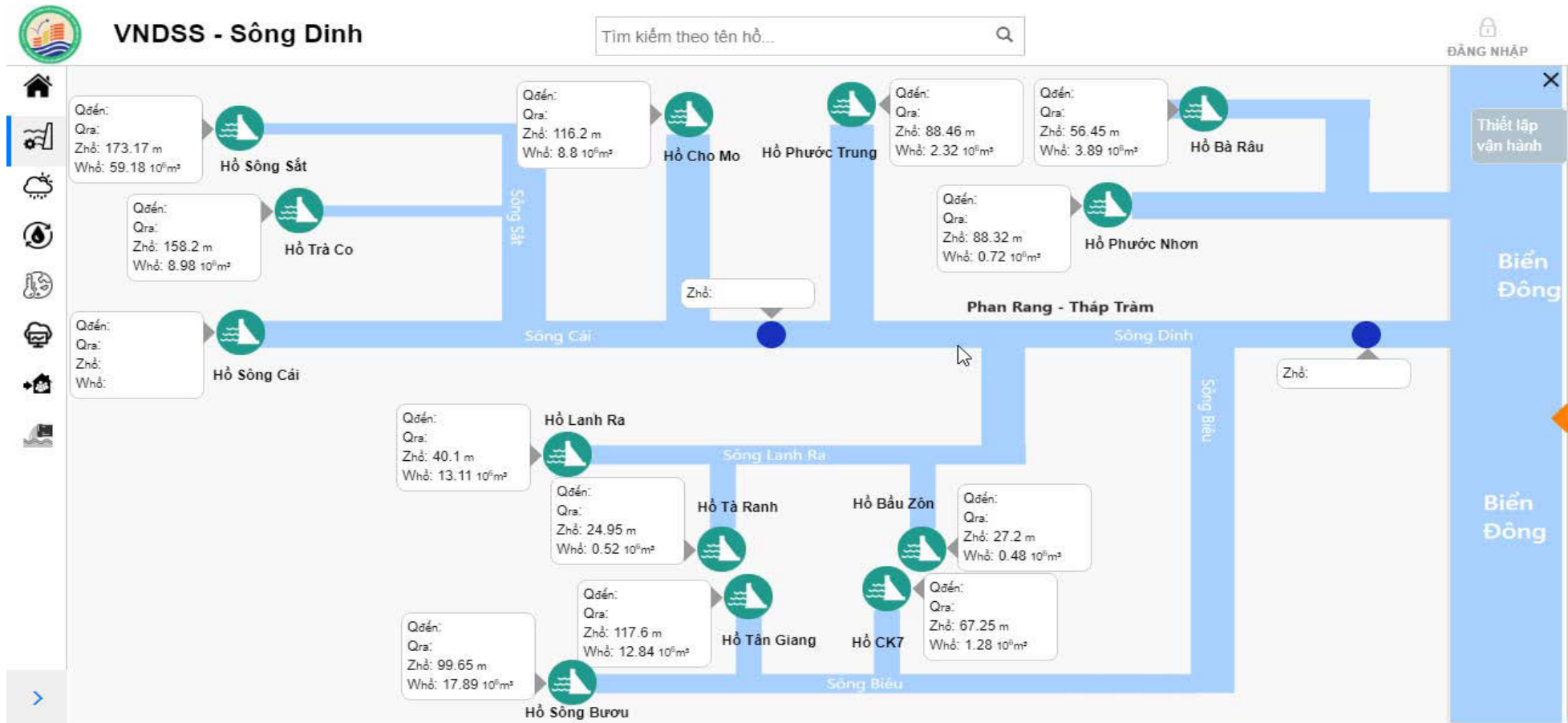
## DECISION-MAKING SUPPORT SYSTEM ON NATURAL DISASTER PREVENTION AND CONTROL (VNDSS)



Homepage interface of Early Warning System for Dinh River's basin

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## DECISION-MAKING SUPPORT SYSTEM ON NATURAL DISASTER PREVENTION AND CONTROL (VNDSS)



*Interface of operating Early Warning System for Dinh River's basin*



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## DECISION-MAKING SUPPORT SYSTEM ON NATURAL DISASTER PREVENTION AND CONTROL (VNDSS)

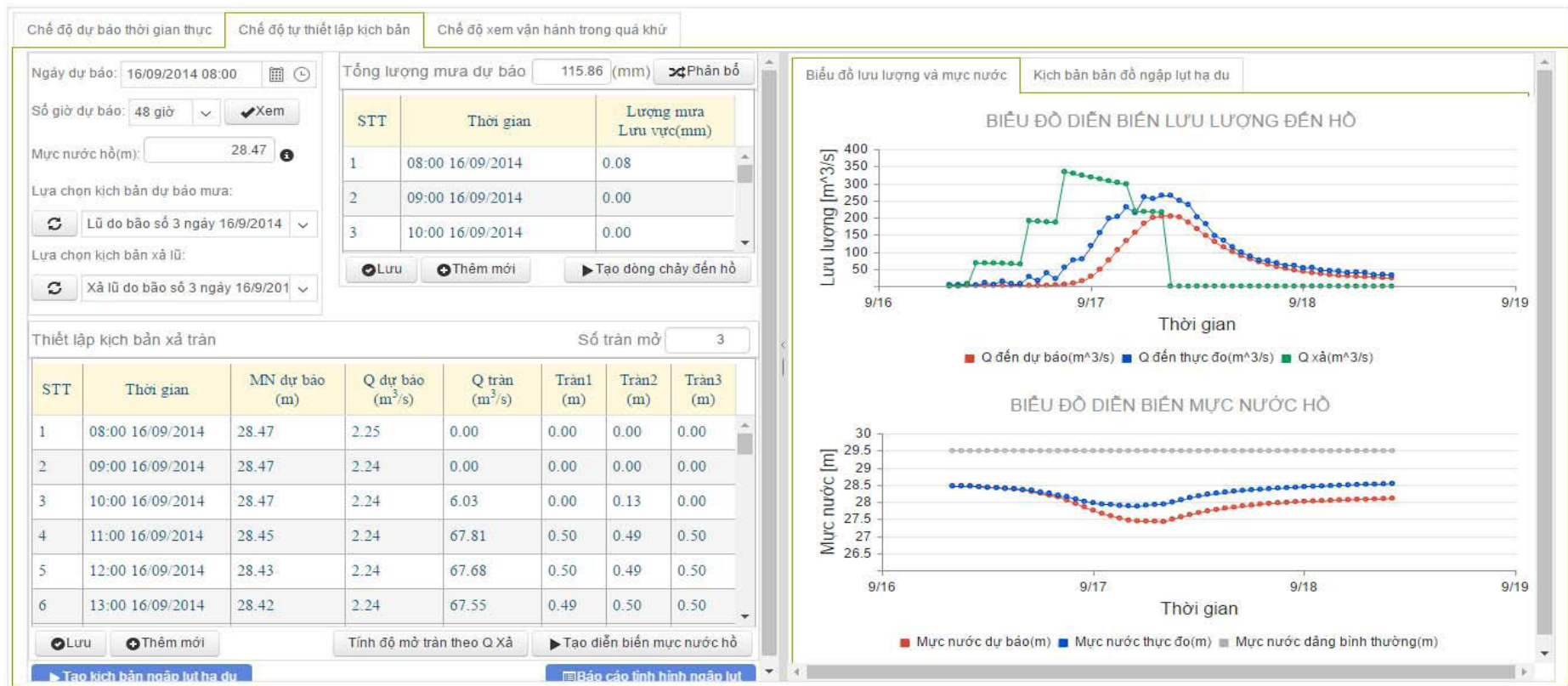
### HAVE IMPLEMENTED SOME MODULES OF VNDSS SYSTEM FOR THE ENTIRE NATION

- Digitized: river-stream network, 1252 out of 5761 reservoirs, and administrative boundaries,
- Data updating system: manually updated for 500 reservoirs; automatically updated for 33 reservoirs (285 monitoring stations); 657 rain gauges, 469 water-level monitoring stations from National Hydro-met Center; 37 reservoirs from EVN,
- 19 reservoirs are equipped with flood forecast software and reservoir operation support system in real time.

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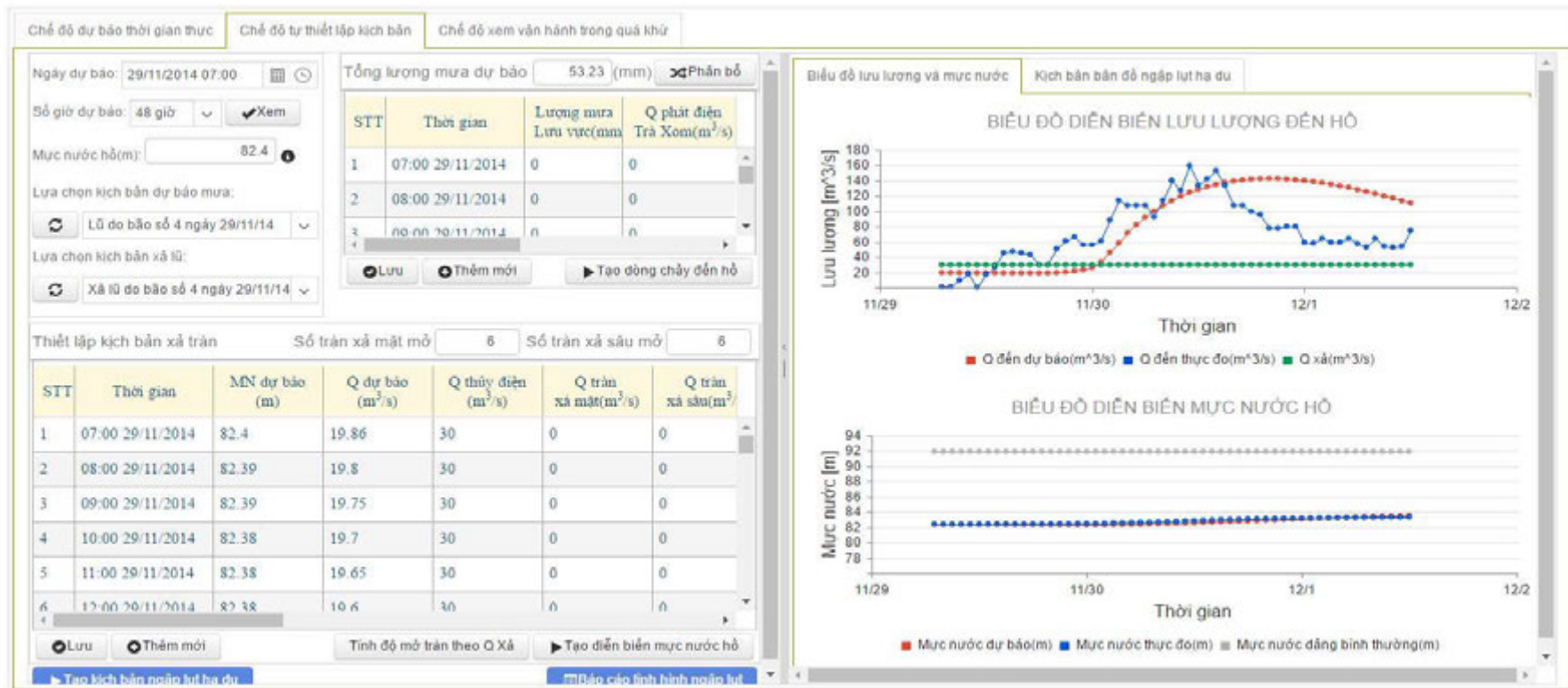
Implementation of early discharge to receive flood at Yen Lap reservoir (Northern Vietnam) during storm No. 3 – 2014, using early warning support tool



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## DECISION-MAKING SUPPORT SYSTEM ON NATURAL DISASTER PREVENTION AND CONTROL (VNDSS)

Decision not to discharge flood to store water at Dinh Binh reservoir (Southern Central Vietnam) during storm No. 4 – 2014 as the forecast inflow to the reservoir maintained at a safe level using early warning support tool

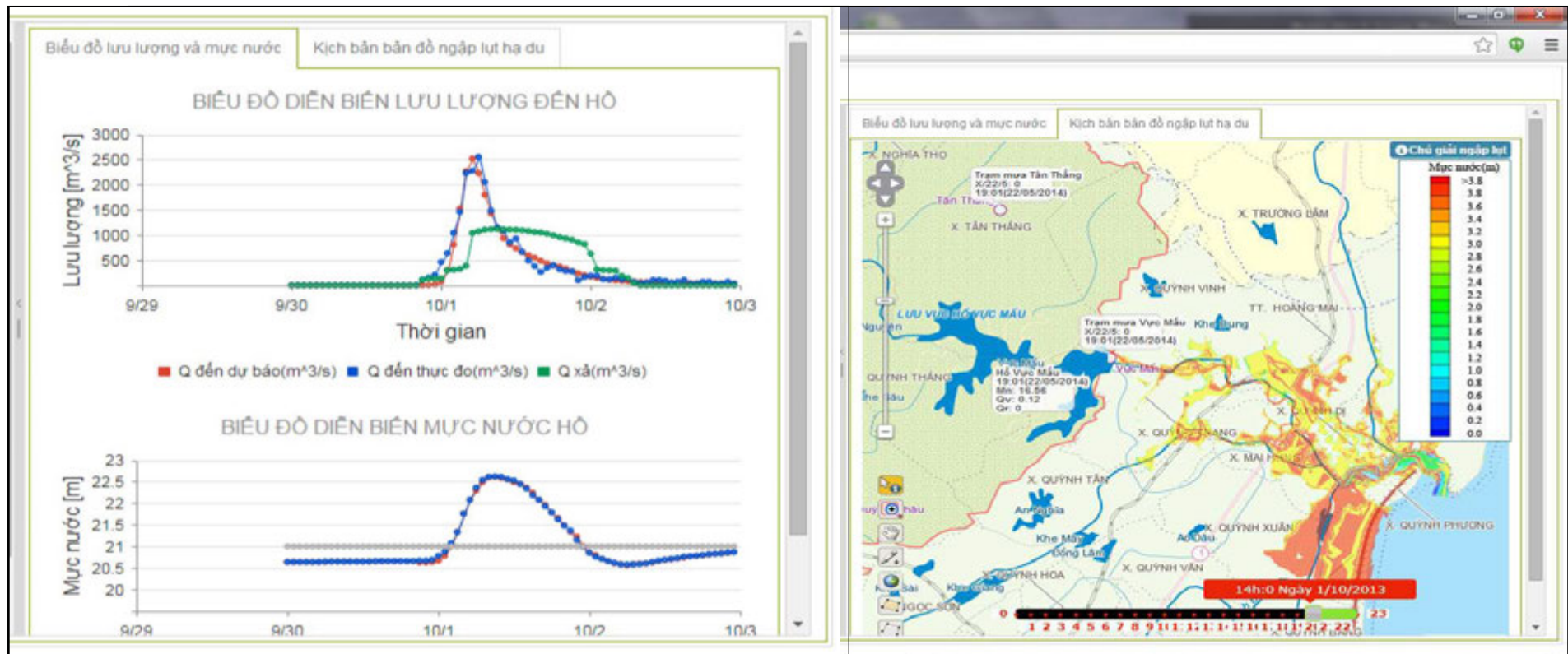




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Images simulating the historic flood at Vuc Mau reservoir (Central Vietnam) during storm No. 10 in 2013 indicates un-optimized flood discharge (no early discharge) due to lack of early warning support tools



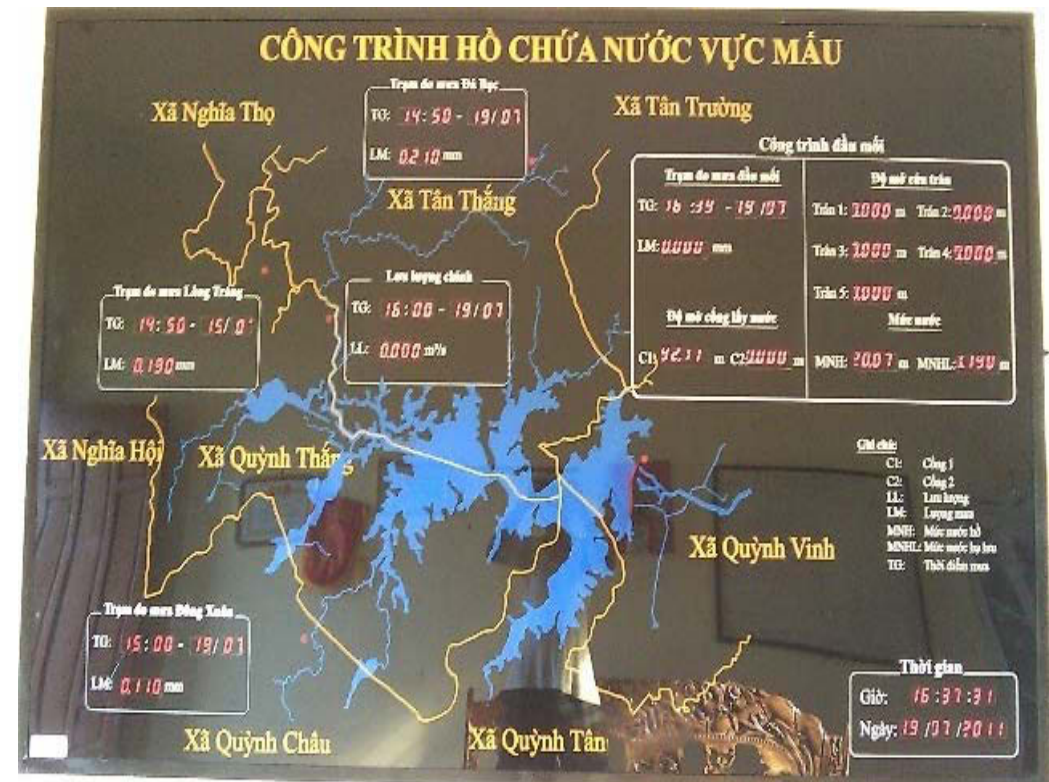
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## DECISION-MAKING SUPPORT SYSTEM ON NATURAL DISASTER PREVENTION AND CONTROL (VNDSS)

### MONITORING SYSTEMS WHICH HAVE BEEN DEPLOYED IN VIETNAM



*Rain gauge at Vuc Mau reservoir, Central Vietnam*



*Electronic board at Vuc Mau reservoir, Central Vietnam*

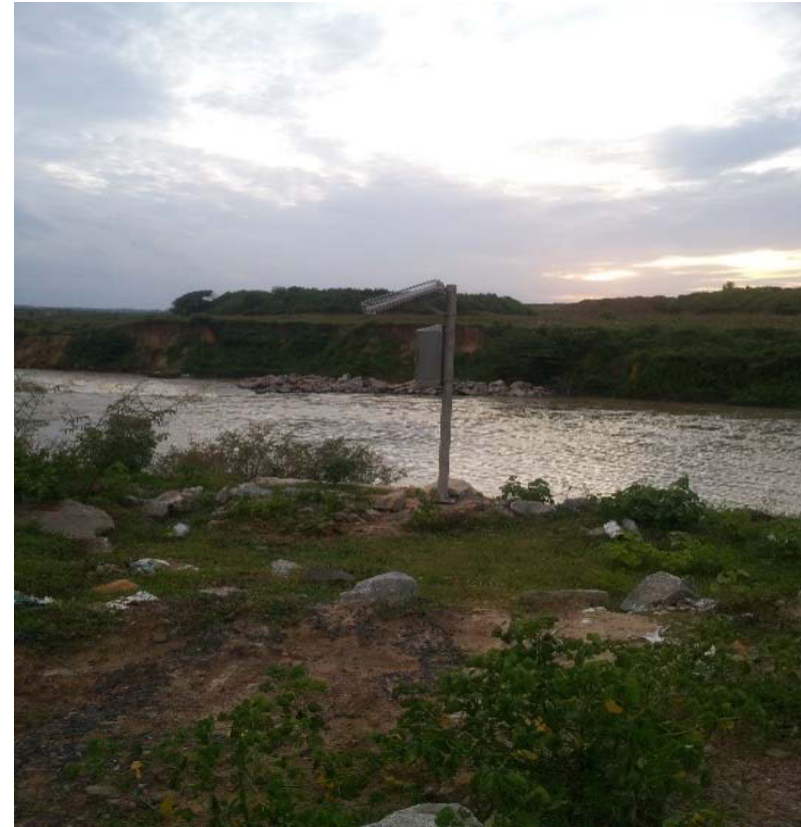
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## DECISION-MAKING SUPPORT SYSTEM ON NATURAL DISASTER PREVENTION AND CONTROL (VNDSS)

### MONITORING SYSTEMS WHICH HAVE BEEN DEPLOYED IN VIETNAM



*Rain gauge at Dinh Binh reservoir, Southern Central Vietnam*



*Downstream water-level monitoring station at Song Ray reservoir, Southern Vietnam*

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### MONITORING SYSTEMS WHICH HAVE BEEN DEPLOYED IN VIETNAM



*Rain gauge on the basin, with surveillance camera and sound-alert system to protect the system at Da Ban reservoir, Southern Vietnam*



*Image from surveillance camera at spillway in Da Ban reservoir, Southern Vietnam*

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### MONITORING SYSTEMS WHICH HAVE BEEN DEPLOYED IN VIETNAM



*Inside of a monitoring cabinet at IaMla reservoir's spillway, Highlands of Vietnam*



*Electronic board and central monitoring cabinet in IaMla reservoir, Highlands of Vietnam*



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Thank you for attention!