



Professorial Lecture UiTM Professor Ts. Dr. Wardah Tahir

Forecasting the Impending Flood Disaster



Program

Professorial Lecture UiTM

Anjung Seri Budiman, UiTM Shah Alam

23 April 2026 (Khamis), Jam 9.30 pagi

Nama Professor Ts. Dr. Wardah Tahir
Tajuk Forecasting the Impending Flood Disaster
Jangka masa : 1 jam 31 minit

Transkrip:

- 27:01 : So the topic of my professional lecture is forecasting the impending flood disaster. Alright, this is the content of the presentation. Don't worry, I'm not going to be too long in any of the topics. We try to be as concise as possible, Dato' pun terima kasih banyak, Dato' pun sangat sibuk lepas ini ada urusan lain. Okay, we start with the introductions. Alright, so floods are actually the deadliest natural disasters of the 20th century. We have an example in 1931, China floods. 4 million people drowned due to disease and starvation and then we can trace back to Malaysia. We have as early as 1902, banjir di Padang Kelab, Selangor. 1926, another massive banjir in Record this has been called as "Bah Merah" in 1926.
- 28:18 : We have 1971, another largest flood in Malaysia in our history and then in our country, those are the history It's again recurring again and again like every year, we have floods in Malaysia. And not only in Malaysia, actually floods are a global phenomenon The recent one, January 2034 in France. We have also in the UK, United Kingdom. We have in Saudi Arabia. We thought that Saudi is a dry country but you know this. May 1, 2024, the flood is actually affecting badly. The country Brazil, we have like heavy rain in Brazil's southernmost state, caused flooding 85, according to local country. So they said, scientists suggest that it could be due to the climate change impact. And then this one, 300 people drowned recently in Afghanistan. So we thought again, Afghanistan is a very dry country but see this, it's a very bad flood office in Afghanistan.
- 29:35 : Water flooded many houses, streets, churches, and rivers It's scary to look at those disaster flooding The region was completely paralyzed due to the destruction.
- 29:52 : Alright, let's just move on. So then we go to what is actually the types of floods, especially in Malaysia. We can categorize three categories of floods, Monsoonal, tidal, and flash floods. As we know that every end of the year, like in November, December. We have floods in the eastern states of Malaysia. Those are due to monsoon season, November to September. So that is the monsoon flood where it is actually a massive flood across the states, but the flash flood is the one that is occurring surrounding us in urban areas.



Program

Professorial Lecture UiTM

Anjung Seri Budiman, UiTM Shah Alam

23 April 2026 (Khamis), Jam 9.30 pagi

Nama Professor Ts. Dr. Wardah Tahir
Tajuk Forecasting the Impending Flood Disaster
Jangka masa : 1 jam 31 minit

Transkrip:

- : That is due to the intense rainfall, like 2 or 3 hours of intense rainfall that can cause floods to our urban areas. Tidal flood is due to high tide. It can occur close to the sea. Now, what are the causes of floods?
- 30:52 : So first, we have studied this one. An example, if you remember, we have 2021 flood on 26th September in Shah Alam. As you can see, we have in front of the stadium. There is Aeon Complex. So during this day, what happened was we have 3 hours. This one here is Batu Tiga Station. If you look at the record, within 3 hours We have almost a month amount of flood events. So indeed, this is actually the main factors causing floods. The extraordinary amount of rainfall and then we also have an example in what we call a tsunami flood here. If you remember, in 2014. How many people were affected?
- 31:54 : 170,000 something were affected. This is the paper that I shared in the newspaper. The articles. Actually, the rain is very high at the upstream somewhere at Gua Musang. The station here. During the day when the flood occurs in Kota Bharu. There is not much rain there but the rain is actually coming from the Gua Musang station. Going downstream like that and it caused a very massive destructive to Kelantan during that time. If you remember, what happened was the flood water is up to the multi-storey building. Those are the first causes of floods. The extraordinary amount of rainfall and then also this one I think everyone knows if you have a lot of deforestation. We can have, what they call the more impervious surfaces. You know, the water is not seeping through. So we have excess runoff that causes floods. So be careful, the town planners when you develop your area. Make sure you have enough detention ponds to cater the excess amount of rainfall.
- 33:16 : Otherwise, it will flood the downstream area. This one is another causing flood I think, as we can see there are many developments at the left bank and right bank of any river. That will constrict the river channel capacity and will cause overflow. I think this one has been much improved



Program

Professorial Lecture UiTM

Anjung Seri Budiman, UiTM Shah Alam

23 April 2026 (Khamis), Jam 9.30 pagi

Nama Professor Ts. Dr. Wardah Tahir
Tajuk Forecasting the Impending Flood Disaster
Jangka masa : 1 jam 31 minit

Transkrip:

- 33:44 : Previously, we had so many slum areas nearby the river. I think the government is actually improving the development of the area. Also, this one, do not throw away rubbish, everyone. Finally, we'll join the river. This one, okay and then we have this is an example of a river full of rubbish. I think this is in Sungai Pinang. Then we have sedimentation that can cause the drainage to be blocked and then, if the drainage is blocked. The glaciers will actually melt and cause the ocean sea level to be rising. So this is another factor causing floods. Okay, next Non-structural and structural flood mitigation. Just quickly, I think everyone may be aware what are the mitigations, let me just quickly browse through.
- 35:12 : Let's look at the mega-structure first. What do we have on the mega-structure flood mitigation. First, we have a good example in Netherlands. We have a very massive storm such as this and then, it is actually due to this previous event killed more than 108,000 people and the country built storms barrier as protecting from invading seas. Strong enough to resist 10,000 years storm making the country as flood-prone. And then we also have Yangtze River. You see, this one is actually they have a very long record of remember, the 4,000, sorry, 4 million deaths in China. So they are installing. They are building this Three Gorges Dam which is a very large massive reservoir. Though they have built this very massive reservoir. Flood still occurs. Very recently, at that area, flood still occurs. So the massive reservoir still cannot cater the whole amount of rainfall in that area. So this is what happened in Three Gorges Dam, the world's biggest dam. But yet, it is still not very successful in ensuring, protecting the country from flood, 2020. I think not a very long time ago. Alright, and we also have our own smart tunnel.
- 36:58 : Alhamdulillah, I think smart tunnel has performed excellently In protecting Kuala Lumpur. Especially from flash floods. I remember a long time ago, before the smart tunnel. Every now and then, in the newspaper Kuala Lumpur was flooded. Every once in a while, we have those news and we don't have those news anymore because I think one of the reasons is the smart tunnel. And then the recent, I think quite popular one in Japan. Let's look at their flood reconstruction. Very massive underground tunnel I think the biggest in the world. The tunnel is 30 meters in diameter and 70 meters deep.



Program

Professorial Lecture UiTM

Anjung Seri Budiman, UiTM Shah Alam

23 April 2026 (Khamis), Jam 9.30 pagi

Nama Professor Ts. Dr. Wardah Tahir
Tajuk Forecasting the Impending Flood Disaster
Jangka masa : 1 jam 31 minit

Transkrip:

- : [Video Playing]
- 38:58 : All right, so what do we have? Our neighbors, Singapore. We seldom kind of heard that Singapore is affected by flood, isn't it? So they are very close to us. They are like us with the climate and the urban area. So what do they have?
- : [Video Playing]
- 39:42 : Okay, so other than that, these are typical flood mitigation structures. It is installed where it is suitable. So it could be suitable to install, for example, this one in Thailand along the Chao Phraya River. If you want to save your very, very important business, so you can protect by flood like this. You can also build river dike flood retention. And this is a very interesting one. Let's watch this.
- : [Video Playing]
- 40:19 : The flood water is actually seeping through on the pervious surface. Okay, so we can build our road, our pavement using those materials. So the water is just seeping through like that, okay?
- 40:33 : All right, so we go to non-structural flood mitigation structure. I'm not going to dwell so much. The first non-structural is the integrated sustainable flood management. We need to have the concerted effort from all parties. Integrated sustainable flood management requires involvement from stakeholders in the development, participatory, catchment with communities too. And then guideline and design standard. I think guideline is already prepared, especially by the JPS. So if we follow the guideline properly, like we build the right size of the drainage system, get the retention pond at the development area, flood will not occur as much as what we are having now. So if this guideline is rigorously adhered to by the public and private sectors, flooding will be reduced.



Program

Professorial Lecture UiTM

Anjung Seri Budiman, UiTM Shah Alam

23 April 2026 (Khamis), Jam 9.30 pagi

Nama Professor Ts. Dr. Wardah Tahir
Tajuk Forecasting the Impending Flood Disaster
Jangka masa : 1 jam 31 minit

Transkrip:

- 41:32 : So we have a much smarter guideline that is available out there. Okay, this is an example of our product where we actually developed design flood estimations guideline system. You can actually try that outside there. This is to facilitate the practitioners, engineers to design following the guideline and suggested recommendation of techniques to be adopted. So it has been patented, got some award from Geneva with congratulations. Alhamdulillah. Okay, we also have this living with floods. You cannot avoid floods, floods always occur, so why don't we just live with floods? Somebody may feel upset listening to the statement living with floods. But actually, it's one non-structural measure to reduce its impact. You can have this floating homes.
- 42:37 : This is a recent one, I think last year, the last two years or last year they built this. And also we can have like sparing areas for floods. So inundate for a while before it recedes like that as a living with floods concept. Highly susceptible areas to floods, face recurrent floods despite all affordable measures taken. So flood-proofing measures include raising the foundation of floating homes. Alright, we are going into the focus of this topic that is flood forecasting and warning system. We can hear that from the news that many citizens, many public were saying that they kind of feel that they are not being alerted properly.
- 43:29 : Alright, so early warning is effective only if people understand the language of early warning and be able to respond appropriately. I think we have good, what do you call it, apps out there giving us the information about flood and early warning. But I think it's how actually the public can benefit those. We can look at example after this. The example that I want to share is one example on Info Banjir website. Info Banjir website, we have many real-time data, rainfall. We are here, Shah Alam is somewhere there. There is a lot of rainfall stations there. So, how much rainfall is actually falling in our area, we can check the Info Banjir.



Program

Professorial Lecture UiTM

Anjung Seri Budiman, UiTM Shah Alam

23 April 2026 (Khamis), Jam 9.30 pagi

Nama Professor Ts. Dr. Wardah Tahir
Tajuk Forecasting the Impending Flood Disaster
Jangka masa : 1 jam 31 minit

Transkrip:

- 44:27 : Let's look at one example of Info Banjir JPS Selangor. JPS Selangor Info Banjir has extra menu. What is the extra menu? They have camera. Let's just look at this example. First, it was raining during that time on the 11th of May. I was trying to check how is the data being disseminated through this website. I checked the rainfall warning. This appears, this is Petaling, where actually we have 19 stations. It's red colour, red colour means warning. We have heavy rainfall. What we do next, we check on what happens. For example, this one at TTDI Shah Alam, there is an alert of red colour there. Let me check what happened in the river. You can actually look at the river water level by the camera provided. This is 3.24pm, the water is rising, 3.39pm. This is at 8 something, the water is almost overflowing but not yet flooding. We are safe there. You can actually look at those cameras from JPS.
- 45:50 : The rest of the main Info Banjir doesn't have camera except the JPS Selangor. Example here, you can check, the red is the alert warning. Alright, let's move on to flood modelling for forecasting. Is everyone still okay? Okay, so we go to our focus of this topic, which is flood modelling for forecasting. What do we have and what have been done in flood modelling for forecasting? I have lots of my students just now, they are very directly involved in this. So, why do we have to model our catchment? For example, this is Sungai Kerayong.
- 46:45 : If you go to the side, this is what is actually surrounding Sungai Kerayong. So, we want to see what happened to this Sungai Kerayong, we can model the catchment. We can model the catchment, giving some input what happened to the catchment. So, this is the step. You need to have the topography, data for flood lanyards, properties and so on. So, flood modelling is important too for understanding and forecasting flood behaviour and its impact. We can, from the model, we can see which area is actually being inundated, that is flood modelling. So, we have, for example, this is where we are, this is Shah Alam, all of us are here now. So, we want to see what happened to this area and first, draw the basin.



Program

Professorial Lecture UiTM

Anjung Seri Budiman, UiTM Shah Alam

23 April 2026 (Khamis), Jam 9.30 pagi

Nama Professor Ts. Dr. Wardah Tahir
Tajuk Forecasting the Impending Flood Disaster
Jangka masa : 1 jam 31 minit

Transkrip:

- 47:35 : This is Klang River Basin, this is being related as Kelang River Basin. We need to have those basins first and then we can do the modelling. So, there are many, many modelling out there. Like, for example, HEC-HMS is very, very straightforward. Public domain, everyone can use, you don't have to buy HEC-HMS. So, we can actually use it directly from the internet, download and use it directly. So, we can actually then, if you simulate, giving input, how much rainfall is being, how much rainfall falling on the river basin, we can see what happened. This is the outflow hydrograph, how much amount of water here, yeah, all right. So, this is using HEC-HMS, using TREX, kita ada pakar TREX, Dr. Jas. Okay, TREX is another modelling, software modelling, you can see how nice it is.
- 48:34 : If you model, for example, Kota Tinggi catchment here, we run the model, see, we can see how the area is being inundated by flood if we simulate the event. Giving the rainfall input, how much area is being inundated. For example, here, the area is red here, so it is, yeah, here is reflected by the image of the flood event during that time, okay. So, this is modelling the catchment, all right. Okay. Now, we can also use Infoworks. Infoworks is another very powerful model, but expensive, okay. You need to buy, costly. But here is our project, we are modelling army complex, yeah, Ulu Kelang, last time. So, we modelled the drainage system.
- 49:31 : Is Xperanti here? Thank you, Daryl. We can actually apply this to Penang, Daryl, at Xperanti because the Infoworks CS, the Infoworks CS is actually, you can model the drainage system and then we can simulate and you can see which drain system, which part of the Penang that you want to model is actually affected by the flood water. So, this is using Infoworks CS. We also have Infowork RS. Other than Infoworks CS for the drainage system, we have XPSWMM here. We also have Infowork RS. Infowork RS is a river. R is river, S simulation. Example is Sungai Muda. This is Sungai Muda in the map, yeah. Very, like snake wing. Ketuk. Alright, so we modelled the river using Infowork RS like this. And then we run the model, we can see how much water is rising like that, okay. Alright, so this is a summary, okay. If you want to apply any very, very accurate result, you have to pay more.



Program

Professorial Lecture UiTM

Anjung Seri Budiman, UiTM Shah Alam

23 April 2026 (Khamis), Jam 9.30 pagi

Nama Professor Ts. Dr. Wardah Tahir
Tajuk Forecasting the Impending Flood Disaster
Jangka masa : 1 jam 31 minit

Transkrip:

- 50:42 : And one very critical point is you have to check the running time, okay. If you want to use it for flood forecasting, you don't want to wait for two or three hours for it to complete, it runs, right. Okay, so the running time for running the program for hydrodynamic is very long, that could be hours, yes. Alright, so those are modelling. Okay, now the area that I want is actually my focus area is, you have the model down there and then the model that I discussed, mentioned just now is taking the rainfall input, rainfall input, it becomes the flood, okay. But what if you want to like focus days earlier, or focus hours earlier?
- 48:34 : Because the real-time value, they give us real-time. If you model onto your catchment modelling just now, you can have like lag time only as the lead time, the water falling onto the catchment, it takes time for it to contribute and so on. But if you have input, if you have input from satellite weather and numerical weather prediction, you could have a longer lead time, especially numerical weather predictions, okay, except that you have to look at numerical weather predictions accuracy. Okay, let's just go very quickly and everyone is getting restless. Are you all still okay? Okay. Some are okay, some are, okay. The NCA office, are you all okay? Alright.
- 52:20 : Okay. Okay, thank you. Alright, so again, I have three, our team has used satellite data, we have also used radar data, we have numerical weather prediction data. Okay, satellite data, I would like to acknowledge Tan Sri sebenarnya yang bagi cadangan using satellite data, okay, long time ago. Alright, so look at the first one, using satellite data, look at this one. This is Typhoon Mawar simulations of using satellite data. As you can see, the red one is actually showing the intensity, the intense value of the rainfall, okay. So, weather satellite is primarily used to monitor and collect data about the earth. Okay, so we have used it to climate monitoring, weather forecasting, environmental studies, natural disasters, yeah, and we have two types of satellite, we have two types of satellite providing weather data.



Program

Professorial Lecture UiTM

Anjung Seri Budiman, UiTM Shah Alam

23 April 2026 (Khamis), Jam 9.30 pagi

Nama Professor Ts. Dr. Wardah Tahir
Tajuk Forecasting the Impending Flood Disaster
Jangka masa : 1 jam 31 minit

Transkrip:

- 53:31 : Other satellite is providing broadcasting, yeah, so this satellite that we are talking is providing weather data, okay. Alright, so these are the geostationary weather satellite, we have, for example, in Japan we have Himawari, nice kan, nama in Japan, okay. So, we have other satellites surrounding the globe. This is an example, yeah, we have Ruby Typhoon in Philippines, look at how much disruptions it caused, yeah. So, the satellite is like an eye, you can actually look at the satellite and you see how, where it is going to go, so you can actually warn by the coming disaster and you can actually then predict how to protect, or at least you evacuate the area before it hits your area, okay. This is Katrina, last time, very intense destructive, and this is not very far away. We think that our country is safe from typhoon, no, it's not really, so we have cases of typhoon Storm Greg, yeah, in Sabah, those are the satellite image. This is in Johor, last time, those destructions, yeah, and then the Tropical Storm Vamei, shown in a satellite image, you know, like there's an eye, there's a pressure, low pressure there actually. Okay, alright, let's just go very quickly, my study before and using GMS, Geostationary Meteorological Satellite Infrared, so there is infrared, there is visible image, so I'm using the infrared image to actually produce rainfall.
- 55:19 : How do I produce rainfall from satellite? That's what my supervisor is challenging me, from satellite to get the rainfall, so I was again, during that time, was very perplexed and actually there is a correlation between the image of the satellite and the rainfall, okay. So, well, basically this is the sort of descriptions of the satellite, I'm taking the data from the MET Malaysia. Okay, so we have, actually the studies is using the characteristics, the features from the satellite to be trained, yeah, we are using AI, now we have a very in thing, yeah, everyone is talking about Artificial Intelligence, so we actually use one of the Artificial Intelligence techniques, the ANN, yeah, to produce the sort of the relating, yeah, the relation, the product relating the satellite images with the rainfall. What did we derive?



Program

Professorial Lecture UiTM

Anjung Seri Budiman, UiTM Shah Alam

23 April 2026 (Khamis), Jam 9.30 pagi

Nama Professor Ts. Dr. Wardah Tahir
Tajuk Forecasting the Impending Flood Disaster
Jangka masa : 1 jam 31 minit

Transkrip:

- 56:38 : The cloud top brightness temperature, yeah, because what? Because the temperature, the infrared temperature is actually relating to the raining cloud, so we correlate those, yeah, we train the rain rate and we produce ANN based satellite reading rain rate, okay. So this is an example where we have flashlight, you can see that the image is showing, yeah. There is heavy rain there, so we try to correlate this, the intensity of the image with the rainfall in a neural network. Neural network is actually training, training, training and finally we got the model, okay. So this is the concept behind it, okay, so this is the technique. We validate with the rainfall stations, okay, so we also try to sort of focus the movement of the rain just now by using cross correlation technique from the concepts of multi cell storm movement, okay.
- 57:49 : So this is simulating flash flood in 2003, okay, and we also produce a software, produce an application from this studies, it has won award, gold award from IID, from ITEX, from USA, impact assessment award. Okay, rain watch, I think it's out there if you want to check this, okay. So we also have produced Q1 paper, not just product, Q1 paper also, okay, use of geostationary meteorological satellite image for convective rain estimation for flood forecasting, this is from Sahut, this is my supervisor from German, and this is from Matt, okay, alright. Next, quickly on radar data, okay, this is the current studies that we are doing using radar data for rainfall estimation and again. This rainfall estimation is to be the input to our flood forecasting, okay, so what is radar data? Anyone has passed through, we may think that it is a golf something, but actually it's a satellite, sorry, radar, inside this globe is a radar, it is operated by KLIA, but the radar is very much needed by the flood aviation, okay, right. So radar works, yeah, they are sending pulses, yeah, they are sending like electromagnetic pulses, the radar is then it reflected, when it hits the raindrop, it is reflected. So we measure the rainfall indirectly by those reflectivity, the reflectivity converted to rainfall, okay. Those are the concept behind it, alright, so okay, what's the significance of radar?



Program

Professorial Lecture UiTM

Anjung Seri Budiman, UiTM Shah Alam

23 April 2026 (Khamis), Jam 9.30 pagi

Nama Professor Ts. Dr. Wardah Tahir
Tajuk Forecasting the Impending Flood Disaster
Jangka masa : 1 jam 31 minit

Transkrip:

- 59:53 : Everyone knows that we already have tipping bucket, we want to measure rainfall, we just measure in the tipping bucket, the rainfall falling into our tipping bucket, so why do we use that? I think it is a very good complementary, yeah, because look at this Klang River Basin, if you just based on the station, there is one station there, one station there, this is the number of station, Bukit Antarabangsa, Bangsa Station 1. Yeah, so on this rainfall station, okay, so you may note that somewhere there, there is a very high intensity rainfall event which may not be captured by the station. That's why radar is very important to give us aerial view of the rainfall event, okay. It's not just enough using the gauge, yeah, gauge can give you true value but the radar is giving you the overall representation, because insyaAllah, section 17 is raining, section 18 is not raining, the distribution of rainfall. That's why radar is very helpful in making sure you have everything captured in your catchment, okay.
- 1:01:18 : Alright, this is the one that I see, this is, if you can see this by the roadside and we have actually climbed, yeah, climbed this, our team, right now we have climbed this, right, we have climbed this tower to see what's actually inside the dome, so this is inside the dome, let's watch this, so actually there is a dish, yeah, the receiving antenna here, looks like a dish, so it is like moving in a 360 degree inside the dome, so the dome is used to protect, this dome is used to protect the dish inside, okay, so that's what we have found and visited inside the dome, okay. Alright, so let's look at how do we actually use this radar value, radar data for our flight forecasting, okay, so example, this is December 18, anyone remember, I think everyone remember, December 18, 2021, it's a very, very, what do you call it, destructive flood insya Allah, in Selangor, isn't it? So, we can look at this, I think this is in somewhere, just, it's a very, very destructive flood during that time, so you cannot, like, let's have overall picture of what the rainfall distribution is by using this radar. Okay, so this is Selangor, this is where we are, Selangor. You can see that this is a very intense red spot, red spot, if you look at the legend, this is a very high rainfall intensity there. Okay, so 7pm, 8pm, so the rainfall is, again, concentrating in a Selangor state during that time, but we also have rainfall there, but somehow maybe Selangor is more urbanised, so it affects Selangor more than the area, which has about the same amount of rainfall.



Program

Professorial Lecture UiTM

Anjung Seri Budiman, UiTM Shah Alam

23 April 2026 (Khamis), Jam 9.30 pagi

Nama Professor Ts. Dr. Wardah Tahir
Tajuk Forecasting the Impending Flood Disaster
Jangka masa : 1 jam 31 minit

Transkrip:

- 1:03:41 : Okay, let's just go quickly, I think I don't have to dwell into, these are the numbers of radar throughout the country. Here we have 18 altogether, so how does radar cover, it covers like a circle of perimeter, radius of coverage, okay, so these are the, what they call it, picture of radar stations. Okay, we, Dr Salwa, this is our paper. So this is Q1 paper, again, using radar input to our flood model. This is a case study of Mat Danak, so this also, the radar also has been developed as a software, and it won several awards there, it is also being used for LUAS water, Lembaga Urus Air Selangor is also using it for management of the river basin. Okay, this is an example of research, Pahang river basin from Kuantan radar, this is a project, thank you JPS for giving us the opportunity to be involved in the project, okay, we also, that's why Ericko is also in the team. Alright, so basically, we have involved in the national flood forecasting and warning system, so our part is here.
- 1:05:08 : We are actually the, this is a very intense, what they call it, integrated, so actually it is being sponsored by Dato' Zack, okay, so we are actually, this is the developed system, KPPIM is our strong team in this, we developed this system for the national flood forecasting system. We use Python script, okay, data visualisations, okay, before that, radar is reflectivity, we cannot read, we cannot even read the data. It's like 0100, how do you understand the code? We have to decipher the code first, putting it to human readable values, so we then visualise, and then we convert this to rainfall by, remember this one, this is reflectivity, this is the, R is rainfall, Z is reflectivity, we are using the Marshall Palmer to convert the radar into rainfall. Okay, so we validate, okay, this is our case study, so we do throughout the first phase, we are just doing Kelantan, Pahang and Terengganu. The second phase, they ask us to do the rest of Malaysia. Alright, so we have to calibrate, yeah, this one, yeah, I think this is a very good opportunity to see how actually we can use this in Sabah, in Sarawak, yeah. Actually, in Sabah, we have problems of quite sparse, the installed rain gauge, not very, normally, not very uniformly distributed rain gauge, so we kind of appreciate to have radar for covering, yeah, Sabah area, right, because less rain gauge over there. Okay, this is the calibration, just look at it very quickly.



Program

Professorial Lecture UiTM

Anjung Seri Budiman, UiTM Shah Alam

23 April 2026 (Khamis), Jam 9.30 pagi

Nama Professor Ts. Dr. Wardah Tahir
Tajuk Forecasting the Impending Flood Disaster
Jangka masa : 1 jam 31 minit

Transkrip:

- 1:07:28 : We checked with the flood event last time, calibrated, yeah. Okay, this is the latest ongoing study, we are using, this is with Selvani, we are using our image, extract the future, and we sort of train with the rain gauge to get the rainfall estimation. Okay, a little more, a little more, last. Okay, so the last but not least is use of numerical weather predictions. Okay, the radar and the satellite is real time, isn't it? They fall, the rainfall is falling, the radar intercept, this is real time. The satellite, they watch from the above satellite, they get the real time value. But numerical weather prediction is actually technique to forecast days ahead, seven days ahead, four days ahead, that's why you can have late time of warning. But I think to study further is a challenge to every student. How do you make it as accurate as possible? So far we, in Malaysia, we haven't produced our own NWP equation. We adopt WRF from the, WRF is from the United States, yeah, NASA. And other equations, if you look at the books, there are many, many equations produced by Europeans, for example, US, but we only adopt from them. And the accuracy is yet to be improved, much, much improved. So basically, numerical weather prediction, what is that?
- 1:09:17 : So you are actually, we have the atmosphere out there, we are actually representing the processes in the atmosphere in an equation. Example of equation is the x component, the y component. So this equation is actually taking into consideration all the processes involved in the atmosphere. It can be very chaotic sometimes, you can just forecast something, but it's not happening sometimes. So use system of differential equation based on the laws of physics, divide planet in 3D NWP model are used to forecast rainfall, yeah. So they can forecast rainfall up to 7 days ahead. So that's why our national flood forecasting system can actually forecast days ahead if you want to have longer lead time using NWP, except that you must make it as accurate as possible. Alright, so these are how it works. Initial data collection, data assimilation, model initialization, model integration, prediction, output generation. So this is what I mean. We have GFS from NOAA, National Oceanic Atmospheric Administration, ECMWF from Europe, we have Japanese military agency from Japan, and now my study is using the WRF from National Center for Atmospheric Research, USA. This is the one that is mainly employed by the MET Malaysia.



Program

Professorial Lecture UiTM

Anjung Seri Budiman, UiTM Shah Alam

23 April 2026 (Khamis), Jam 9.30 pagi

Nama Professor Ts. Dr. Wardah Tahir
Tajuk Forecasting the Impending Flood Disaster
Jangka masa : 1 jam 31 minit

Transkrip:

- 1:10:56 : They also use ensemble. Alright, so this is the first thing. Our group has studied how effective it is. Simply using the data, how good it is. The data coming to us is not like radar. Radar you have to decipher the code, you have to understand. The data from NWP, you give it already in rainfall value. It's in numbers like that. That's one method. Another method, you can use the grad software to read the values. So if you use the direct method, we can actually check how accurate it is. This is an example of checking it with daily data. We also check for other events. The statistical verifications for NWP use direct to forecast rainfall is not very satisfactory. That's why MET Malaysia always give weather forecast like "hujan merata rata", "hujan lebat". They don't give you values. They don't give us 100mm, no. It's quite tough to do that. The quantitative forecast. So what our students do, what our team do, they try to extract the data. They take not just the rainfall data. Intern, are you here intern? Data they're using rainfall, relative humidity, temperature. Not just rainfall. So they train this using artificial neural network to be trained with the aerial rainfall value. So they then drop this, employ this to Kelantan River Basin. Alhamdulillah, the value is promising.
- 1:13:07 : It can be improved further. It also has produced this as a product. It won several awards there. So, conclusion. Alhamdulillah, we are at the end already. So let me just read the conclusion. While floods are often unavoidable. We have floods all the time. So the forecasting and warning of the impending disaster can mitigate the adverse impacts. So flood warnings can be straightforward. Just by the water level, you can already have flood warnings. Or more thorough by analysing and modelling the river basin. Flood modelling is the process of modelling a catchment or river basin. Simulating flood modelling. Just now we had HMS, T-Rex models. So those are flood modelling. To look at how from rainfall becomes flood. So by using data, by using gauge data, you can have certain lead time. But if you want to have extra lead time, you can have input. Alternative input to rainfall is from GMS, satellite data, radar data, NWP data. For input to the flood forecasting model. To have a better lead time of forecasting. So the multi-sensor data into flood forecasting enhance the capability of the national flood forecasting system. If you check the website, there is a person called Emma Braun.



Program

Professorial Lecture UiTM

Anjung Seri Budiman, UiTM Shah Alam

23 April 2026 (Khamis), Jam 9.30 pagi

Nama Professor Ts. Dr. Wardah Tahir
Tajuk Forecasting the Impending Flood Disaster
Jangka masa : 1 jam 31 minit

Transkrip:

- 1:14:42 : Emma Braun says, Malaysia has raised the bar for tropical flood forecasting by embracing a modern non-structural approach to flood management with the development of its world-leading national flood forecasting system. So among the challenges to flood forecasting, this is my point. The challenge is you have enormous data for processing. There is a complexity in processing, NWP, hydrological models. It takes time. As well, if it is even working, you have a problem, a challenge of how public is alert. How much public is actually alert to the warning. As well as the public alertness to the flood warning. My handphone, I have the Amaran Infobanjir. If there is a heavy rainfall, suddenly the notification. That you can actually adopt. How the public can actually employ whatever is given to us.
- 1:15:54 : As well as the public alertness to the flood warning, and the required response and resilience. So if you have been warned, be resilient, get prepared. Do not cause havoc like that. It can actually solve the flood problem more appropriately. Constant effort needs to be made by all parties involved to ensure the effectiveness of the structural and non-structural measures in flood mitigation, building a more resilient society and sustainable environment. Thank you so much.