ATTENDANCE

Michael Nash	Manager Natural Assets – Hinchinbrook Shire Council
Breanna Camp	Minute Secretary – Hinchinbrook Shire Council
James Stewart	Director Infrastructure and Utility Services – Hinchinbrook Shire Council
Matthew Buckman	Biosecurity Team Leader – Hinchinbrook Shire Council
Mike Ronan	Manager Queensland Wetlands Program – Department of Environment and Science
Chris Beadle	Principal Engineer – Water Technology
Jenna Johnston	Senior Scientist – Water Technology
Adam King	Senior Officer Environmental Operations Management – Townsville City Council
Marcus Sheaves	Professor – James Cook University

Hinchinbrook Shire Mayor, Councillors, CEO, community and external partners – refer to attendance sheet.

AGENDA ITEMS

1. Introduction

Mayor Jayo welcomed staff, Councillors and the community to the Taylors Beach Coastal Reserves Community Consultation Session.

Michael Nash explained general housekeeping, including emergency exits and amenities.

Michael briefly outlined agenda for the evening, introducing the guest speakers; Facilitator Mike Ronan – Manager Queensland Wetlands Program at the Department of Environment and Science, Chris Beadle – Principal Engineer at Water Technology, Jenna Johnston – Senior Scientist at Water Technology, Adam King – Senior Officer Environmental Operations Management at Townsville City Council and Marcus Sheaves – Professor at James Cook University.

2. Mike Ronan, Manager Queensland Wetlands Program – Department of Environment and Science

2.1 Walking the Landscape Process

Mike Ronan explained how the Walking the Landscape process works, acknowledging it began approximately ten to eleven years ago, largely because of the 2011 floods in south-east Queensland where communities questioned why and how these events happen.

The idea of the Walking the Landscape process is to engage the community for input via maps and discussion to understand and build a common understanding of how the systems/catchments actually work.

Mike explained that this evening's session was not about coming up with management solutions but is more about getting everyone on the same page and having the same understanding about how the 'system in Taylors Beach' works, to then in future, determine appropriate solutions.

2.2 Herbert Catchment

Mike explained some notable details of the Herbert Catchment, being the biggest catchment in the whole of the wet tropics (approximately 40%) and is interestingly split between the wet and dry tropics with the southern end of the Herbert acting as a transition zone.

The upper part of the catchment in the Atherton Tablelands is different to what we have in the low land area. This is notable because the sediments that make up the lower part of the catchment and our coastal areas, come from right up the top of the Herbert catchment.

The geology underneath this area is largely intrusive volcanics. The volcanic material has intruded through the surface, therefore a lot of hills in this area are granites and felsites. Granites and felsites generally break down into a sandy material.

Mike explained that we also have a bit of basalt (volcanic material) at the top of the catchment, which usually gives rise to very good agricultural soils, like the catchments further north (Innisfail). This material erodes from the top of the catchment and flows down through the Herbert River Gorge and is deposited into our floodplains.

Roger (resident) questioned whether the sediment coming down the Herbert is fine material. Mike explained that the lower Herbert alluvium is a generally mixture of very fine (silt) and coarse (sand). Places such as Stone River have coarse material whereas other places have more fine material (like from the basalt), which all ends up in the lower part of the floodplain and is often deposited in layers.

The Herbert floodplain itself goes very deep; in some places the sediment is found to be approximately 70 meters deep. There are four separate major aquifers in the lower Herbert. With the highest (S1) being about 10 meters down where lots of people extract water from, the other three aquifers below it generally does not have as good a water quality, but this all makes the Herbert floodplain even more complicated than general mapping demonstrates. This is important to note because when water flows down the catchment system, a lot of it flows out through the waterways we see today, however a lot of it also goes into the ground water and comes out at sea (wonky holes – underground springs at sea) through paleochannels (old river channels), which run underneath the ground.

About 7,000 years ago, the mouth of the Herbert came out near the base of Paluma Range and has since migrated north. Cattle Creek, Orient Creek, Trebonne Creek, Palm Creek, right up to Victoria Creek and even Gentle Annie, were all previous mouths of the Herbert River. This is important to note as many of the sediments that have built up all our coastal areas have historically come from the Upper Herbert. As the mouth of the Herbert has migrated north, these sediments that nourished our beaches are no longer being supplied, resulting in a sand supply issue as the existing coastal sediments continue to migrate north.

Note: There are no major sources of sand coming from the south, because the Burdekin River sand gets pushed out to sea by Cape Bowling Green and the Ross River is dammed and has several weirs. The Port of Townsville also interferes with natural sand supply from Ross River to Rowes Bay, where there are also sand supply issues.

In closing on how Taylors Beach came to be, Mike explained that Taylors Beach would have originally been the mouth of the Herbert River some 100's of years ago with its own sand supply, but now this sand not being replenished.

2.3 Coastal Processes

Mike explained that sand along the coast generally moves north, with sand in our southern areas coming from the Burdekin and Black River. Mike explained there is not as much sediment coming through to this system as there would have been in the past.

Currently, sand moves north along Forrest Beach and Taylors Beach where the spit is formed. By use of the aerial mapping, Mike showed how the sand then spins off the top of the Taylors Beach spit and rejoins the coast further north towards Gentle Annie and up into Lucinda.

Mike further explained that he is not certain on what happens to the sediment that now comes out of the Herbert, however, believes some of it continues on up through the Hinchinbrook Channel.

Ramon Jayo commented that it seems the sediment stops at the mouth of the Herbert and does not move as the area seems to have built up over time. Mike commented that this may be the case for some of the sediment.

Mike talked more about the Taylors Beach area, explaining that it is sitting on a sand ridge, located amongst mangroves and mud flats. The sand in this area is quite coarse and there are a lot of sceptic systems associated with housing, which a majority of will get into the coastal system. The area is also serviced by a town supply of water, so over extraction of any ground water should not be an issue.

Residents added that there are many bores in the area. Mike stated that any excess extraction of fresh water from the dune itself would be of concern. If too much freshwater is sucked out, saltwater from the ocean can replace it, and once this happens, it can be very difficult to get back out again.

Kate Milton questioned the sand filling up at the mouth of Victoria Creek and whether it was coming from the ocean or down through the Herbert. Mike explained that most is likely coming from the ocean through coastal processes and tidal movement, however this would be further explained through other presenters throughout the evening.

Mike explained that before any issues in a particular area can be addressed, the surrounding systems must be understood as they are all linked together in some way.

Adam King commented that the Black River historically supplied a lot of sand up the coast, however it was extensively sand mined in the 1960s and 1970s. When a river system gets mined, it can affect the sand movement along the coast from south to north as the sand is not resupplying the beaches, and now they are eroding. Even when the sand mining ceased, the river (and all of the holes created) still takes time to fill back up with sand, before the sand could be discharged at the mouth of the Black River and continue travelling north again. The delayed impact of this can be many decades.

Anytime something is done to the south, it affects the sand supply to the north. Adam continued that since the sand mining has ceased, the Black River is filling in and it can be seen that the beaches to the north of this are progressively improving and do not seem to have an erosion problem anymore (i.e. Saunders Beach). However, there is still quite some time and distance for this to continue up the coast, and re-supply Hinchinbrook.

Ramon Jayo questioned the quantity of sand transport that we are dealing with as a previous study of Forrest Beach showed that approximately 25,000m^3 of sand travels through the area each year.

Adam explained that areas such as Rowes Bay only have about 3,000m^3 of sand that travels through each year due to the movement impacts caused by the surrounding rock walls, however areas such as Saunders Beach and north along the open esplanade, there is up to 30,000m3 that travels through. Volumes change from place to place, but the sand budget needs to be equalized, for example if 20,000m^3 is being moved and only 3000m^3 replenished, then you are going to have erosion issues.

Mike continued to explain how Taylors Beach sits in the broader scheme of things through the Digital Earth Australia Coastline platform, demonstrating coastline erosion and deposition over time, particularly noting the movement/eroding and building of the spit. Mike demonstrated that the Taylors Beach foreshore is accreting with a possibility of this sand migrating north through coastal processes and growing the spit again in the future.

Mark (resident) said originally you could stand at the boat ramp, and you could not see the Palm Island group or spit because it was once covered with trees, and now you can see straight through. Mark further noted that the spit went out much further, to which Mike addressed this would be likely as the Digital Earth platform only goes back about 35 years.

Adam added that in addition to coastlines going in and out and the sand spit getting shorter and longer, the alignment of the coast can change as well with different areas of beaches accreting and eroding over time. This often depends on the strength and direction of the south-easterly trade winds.

Mike noted that Hinchinbrook as a whole is a very dynamic area and is vulnerable to changes at any time.

Roger (resident) questioned if a cyclone were to hit, would it have a major effect on the sand in Victoria Creek. Mike explained that cyclones can have significant impacts, however because the sand in Victoria Creek is so extensive and the water is shallow, it would most likely dissipate the energy as it crosses the shallow creek mouth and knock out quite a bit of the energy in the system.

Adam added that while some cyclones obviously damage the top of the foreshore, they are an important part of restoring the balance of beaches by throwing sand from the tidal flats up on top of beach, and it is important to understand this because that new dune that is formed is your protection against the next big event.

3. Chris Beadle, Principal Engineer – Water Technology

Chris opened explaining that his role is to understand coastal processes, specifically tides, waves, winds and tropical cyclones, and from the basis of these, understand the movement and flow of sand along the coastline and in and out of estuaries such as Victoria Creek.

3.1 Tides and Currents

Chris explained that there is a relatively large tidal range in the Taylors Beach area, sitting at about four meters. This means that Victoria Creek can be exposed to some fairly strong currents which have the ability to move sand on the seabed, thus causing erosion.

Chris continued that the strong tidal currents in the creek entrance are constantly moving the sand in and around the mouth of Victoria Creek. Because the tides never stop, the sand in the system never stops shifting around, resulting in a constant change of flow channels through the creek entrance.

The shoals and the foreshore banks at the entrance can be very mobile, however this is a natural process and happens at most estuary entrances that are similar to Victoria Creek.

This channel movement has affected the western side of the spit in recent decades. Demonstrated via aerial images, Chris explained how the channel has migrated and eroded the foreshore between 2007 and 2014, however has remained relatively stable since. It was noted that the channel will likely migrate again in the future, but the direction of this cannot be predicted.

3.2 Winds

Chris explained that the South-East Trade winds dominate our region and are very common, particularly in the dry season. During the wet season, winds are a little more east to north-east (including the summer northerlies as well), meaning we receive a seasonal variation in wind. This means the winds affect the direction of waves, resulting in both erosion and accretion along our foreshores.

3.3 Waves

When waves move along the coast, they are generated by the wind. As the winds are predominately from the south-east, so too are the waves.

When the waves come in and get a little closer to the coast, they undergo a process called refraction. This means although the waves are approaching the coast on an angle, when they get closer to the shoreline, they 'grip' the seabed and end up approaching the shoreline more front on, rather than from an angle.

3.4 Coastal Sediment Transport

The impact of the wave energy from the south-east results in pushing the sand along the coast from south to north. This northerly directed sand movement occurs along much of the east coast of Australia.

Chris referred to earlier conversations regarding the rate of sand movement in this area of around 20,000m^3 to 30,000m^3 every year, noting it is important to keep in mind that it is not a constant, steady rate as it depends on the differing wave energy.

This process is common, and Chris demonstrated this via a map of Australia, explaining that coastal sediment transport often travels from south to north.

3.5 Local Sand Movement

Chris moved on to the sand movement specific to the Taylors Beach area, explaining that as sand travels north up the coast, it gets intercepted by the currents coming in and out of the Victoria Creek entrance.

From there, one of two things happen; some sand gets sucked into the creek entrance by incoming tidal currents, and this has helped to create the sandy shoals in the entrance.

Some sand also gets pushed out to sea by the outgoing currents which has created a sandy sub-sea delta in the nearshore waters. However, this sand keeps travelling north along the seabed and reconnects to the coastline further north, creating a fanlike pattern that can be seen on the aerial imagery.

As the sand moves along, it bypasses around the delta and reconnects to the shoreline further north, meaning the sand supply bypasses certain parts of the coastline which have been eroding for years.

3.5.1 The Taylors Beach Spit

Chris explained that the spit on the eastern side of the estuary entrance goes through cycles of building up and receding. However, it is not stable, noting this is natural and happens at many creek entrances around the country.

Via aerial images, Chris demonstrated that the spit would grow up to 450 to 500 meters long (which is really important for erosion along the Taylors Beach foreshore and township). When the spit is fully developed, it provides a protective buffer from the northerly winds/waves (from either summer northerlies or from potential cyclones).

Roger (resident) questioned if Chris believed the growth and presence of the spit was a good thing, to which Chris addressed from a one perspective it is, as it blocks the wave energy that contributes to erosion in the area.

The flip side of this is, when the spit does erode back, the wave energy has the potential to get right into the foreshore/township.

Chris further discussed the recent history of the spit, presenting a graph that shows how the spit has grown and receded over the last 30 years. From the late 1980s up until the early 2000s, the spit consistently grew for about 12 years, and then detached and disappeared in about 2 years.

There was seen to be another period of growth for 8 to 10 years where the spit was quite stabilised, and then in only a couple of years it has receded again, and now appears to be currently growing again.

History shows the spit can grow for many years and then recede very quickly as the sand detaches and continues moving north along the coast. These growth and recession cycles mean that the spit can come and go over decades.

Adam King added that another cycle on top of this is the lunar cycle. There is an 18-year lunar cycle where the tides get bigger and there are more of them for nine years, then they get smaller and less of them for the next nine years. If you look at sea level rise (which is still relatively small) compared to tidal movement, it is every 18 years when it is in the phase of larger tides. This also correlates with a higher chance of a cyclones, making the impacts greater.

Adam continued that the high tides often occur during the cyclone season, hence why January to March is not ideal for beach restoration works (in summer), not just because of the potential risk and impact of it getting washed away but also because there is loads of big tides moving lots of sand around, meaning you are better off doing coastal protection works late April to about July, when the tides are smaller and the risk of bad weather is reduced.

3.6 Shoreline Change

Chris went on to demonstrate timelapse footage over a 30-year period of the Taylors Beach estuary, which highlighted how much the channels move around, and explained that this is a useful tool to understand how the processes work over time.

Chris continued that something to think about in terms of shoreline erosion, is that Taylors Beach already has a series of coastal protection structures to provide a 'last line of defence' from erosion, and how these might be improved as part of the Shoreline Erosion Management Plan (SEMP)

3.7 Tropical Cyclones

Additional to the day-to-day coastal processes in action, one thing to keep in mind is that periodically, we are going to get hit by tropical cyclones. Chris presented a map of 25 of the most severe cyclones to hit the area in the last 50 to 60 years. Referring to the most recent bureau's tropical cyclone database, the frequency of cyclones to hit this area within a 200km radius, is on average, one per season. This data is not regular.

Cyclone occurrences can be more frequent during La Niña periods, but severe ones can occur in any given season. The effect of cyclones is also more severe and hazardous in this area when they hit to the north (because the winds run clockwise in the southern hemisphere), and this generates on shore winds, waves and storm surge to the south of the cyclone, resulting in erosion and flooding. Cyclones that track to the south, also bring a lot of wind and waves, however, do not have the same impact because the winds are offshore, generally with less intense rain.

3.8 Storm Tides

Continuing, Chris explained that when cyclones pass to the north and we get big onshore winds, they can also generate storm surges. Essentially, those strong winds cause water to pile up at the shoreline, where a tidal level can be higher than your normal every-year high tide, causing severe coastal flooding that can damage properties and important infrastructure.

Adam King added that the Bureau of Meteorology has only just recently updated its highest astronomical tide levels, which is now based on the 18-year lunar cycle, where we had previously been using one last updated 15 years ago. Now you can see the actual difference in sea level rises from global warming changes, noting that Townsville's highest astronomical tide was 4.11m, and now that it is updated, it is 4.18m; 8cm higher than they were.

Luke (resident) added that he notices that the high tides are higher and the low tides are lower than what the tide data suggests it should be.

3.9 Coastal Erosion

Chris explained that another hazard to keep in mind is coastal erosion, where elevated tides and big waves can generate storm erosion at the coastline, especially during cyclones.

Most open coast beaches (i.e. Forrest Beach, the outer side of the spit at Taylors Beach) will be stripped of sand, which is sucked off shore and sits in a sand bar parallel to the coast. However, these open beaches naturally recover in the months/years/decades after a big erosion event with calm weather and waves that gradually return the sand to shore. Therefore, the shoreline is almost never stable and is constantly changing.

Roger (resident) mentioned there was two different gradings of sand in Victoria Creek; just up from the boat ramp there is coarse sand that can almost double in size overnight, and if you travel up to 50 meters away, you can find a finer sand.

Chris explained that in the estuary delta area, you have marine sands that get sucked in but you also have finer sediments that come down from the river system which is largely made up of alluvial sediments and streambank erosion from further upstream, so the area is made up of different grade materials.

Both Adam King and Chris further reiterated that beaches will recover naturally, so long as we let them.

3.10 Importance of Dunes

The importance of a properly developed sand dune system on the open coast (which is not necessarily applicable at Taylors Beach in terms of the estuary entrance), is that it plays a crucial role in protecting assets and infrastructure and provides an important buffer that protects against erosion and coastal flooding.

Without a properly developed sand dune buffer, severe storms can remove hundreds of cubic meters of sand from the beach in front of properties and infrastructure which then are vulnerable to damage. If we build too close to the front of the dunes, property and infrastructure is likely to get washed away, especially where dune recovery is not supported.

Therefore, a developed dune system provides a natural buffer to protect against storm damage. If the dunes are tall and wide enough, when cyclones hit and erode the dune, there usually is still enough sand left in front of the properties to keep them safe.

3.11 Future, Longer-Term Issues

Chris explained that when planning for erosion over the next couple of decades, it is important to keep an eye on the longer-term issues and how to combat them. Things to consider are sea level rise and coastal projections, coastal erosion and long-term shoreline recession, increased

cyclone intensity (cyclones get their energy from the warmth of the ocean), climate change and how these processes might change in the coming decades.

Session break 7.18pm.
Session resumed 7.37pm.

4. Mike Ronan, Manager Queensland Wetlands Program – Department of Environment and Science

Mike re-introduced the Taylors Beach area and opened the session for community consultation. Roger (resident) explained that he has only lived in the area for four years, however he has noticed that when dredging is done at the boat ramp, all the sediment comes up onto the yabby beds and kills them off completely, noting it takes at least two years for them to re-establish.

Luke (resident) agreed with what Roger explained and added that dredging does not last and it does more damage than good. Luke further explained that further north of the ramp there used to be dozens of old mangroves and in the 11.5 years he has lived in Taylors Beach, they have gone. Luke added that he has observed the high tide mark over the years, and it has moved. Overall, Luke has suggested that the project management team find a permanent solution to the erosion problem, rather than temporary fixes such as dredging.

Roger added that two creeks at the end of the rock wall have closed off because of the dredge spoil being dumped at the end of the beach which has now filled up the creek mouths and added to the problem.

Janet (resident) said there is a lot of yabbies in front of her house where the stinger net is now (near the boat ramp), and from the point to the net was all mussel beds. In front of the houses on John Dory Street, on the edge of Victoria Creek, there was also a lot of mussel beds.

Janet added that the ridge (demonstrated via mapping) used to be where the beach went out to in the 1940s, with trees and a shelter shed. Mike questioned whether there used to be a channel that ran inside of it, Janet advised there was a permanent channel and on the lowest tide, as kids, they could swim up to their chest in water. This included a 'barra hole' in the lowest tide.

As a child, Janet said her father could catch many fish and they could walk out in the low tide and find pipis, sea urchins and shells however now it is all gone. Janet queried what happened to all of this.

Mike further explored these concerns, confirming there has been a change in sea life, advising that the beach used to come out to where the ridge is seen in the map and that the channel ran through the inside. Janet suggested that all the sand from the beach has swept out and filled in the pre-existing channel.

Lynene (resident) added that in the 1940s when the cyclones went through, Council used to bring the dozers in and put the sand back up on the beach. Various residents agreed with this statement. Mike agreed this may have been the method for coastal management in the 1940s.

Mike questioned residents on the approximate timeframe the mussel beds left Taylors Beach, with numerous residents commenting they left around the time of the cyclones.

Mike also confirmed that there are currently active yabby beds throughout the Taylors Beach area, again with numerous residents confirming this statement, however noting that they only returned about two years after the dredging around the ramp.

Ramon (resident) advised that he disagrees with the dredging statement, commenting that he was involved in the development of the rock wall and movement of sand, and sand is only put where it is recommended to go. Ramon demonstrated two locations where sand was placed, explaining that drains to the north of the boat ramp had been opened, however through natural processes, sand has travelled north and closed them off again. Ramon suggested it would be great to deposit some sand further north (just north of the township), however it is extremely muddy and not accessible.

James Stewart confirmed that Council had a licence to shift 15,000m^3 of sand in the first dredging operation, which the area has now been dredged three times.

Mike queried the location of where the dredging occurs, Ramon explained the area is about 15 to 20 meters north of the boat ramp. Majority of it is pushed up to the end of the rock wall, which was fairly exposed when dredging first started, however now there is a substantial amount of sand there.

Ramon also suggested that it would be good to find a solution that could build the beach in front of John Dory Street, which has been 'rock-walled' without any sand deposited in the area.

Mike questioned the type of material that is being shifted in and out of these areas, to which Ramon addressed was fine material.

Mark (resident) confirmed the additional information everyone had input, adding that when you once stood at the boat ramp, you could not see the Lucinda terminal and Palm Island group as the coastline was much further out, by approximately 300 to 400 meters. However, now that the beach has eroded and the spit has reduced, these are visible. Mark demonstrated (via the map) an approximate location that the spit once came out to, which was vegetated. Mark said his main concern is not the natural occurring erosion, it is the erosion caused by human activity via quad bikes and 4WDs who are travelling in the vegetated areas. Mark also included that he heard chainsaws over on the spit recently.

There is reckless behaviour (fires, camping, burnt tracks, 4WDing) right up the coastline from Forrest Beach to Taylors Beach in the vegetated areas. Mark said he believes in conservation and that the vegetation provides some sort of protection to the coastline and associated beaches, huts, and houses.

Mark believes Council should implement 'No Vehicle Zones' or regulations in the vegetated areas as there is currently no care for the environment.

Mayor Ramon Jayo confirmed that these mentioned behaviours and activities are unlawful, however whilst laws are in place, enforcement is almost impossible with police availability and resources.

Chris (resident) who has lived in Taylors Beach for 10 years and known the area since the 1980s said that he used to go water skiing and camping over on the spit in the 1980s. He has recently taken part in research in the history of Taylors Beach, including review of Queensland Government archived aerial imagery where photographs from the 1940s shows a totally different image of Taylors Beach then to what it is now.

Via the map (approximately John Dory Street), Chris demonstrated where a mangrove hedge was put in by the locals to stop eroding land in front of their properties. There has been two or three rebuilds of the rock wall on the southern end of John Dory Street which has only washed away. There are also mangroves adjacent to John Dory Street that never used to be there in the 1940s, instead there was a creek that ran through where people could launch their boats.

Chris explained that the science brought to the session is greatly appreciated and educational; this information alongside the archived data tells us that the Taylors Beach area is constantly changing and suggested that the changes in the yabby beds may not have anything to do with the dredging and could just be a result of natural processes. Chris added that he has not noticed much difference in the yabby beds himself. Chris said the main question he has is, how do the residents of Taylors Beach maintain what they currently have and to what standard should it be maintained to ensure their quality of life that a coastal area (should) offers.

Mike explained that the process of these workshops is to establish an accurate background of each coastal area to understand the values and how the coastal processes work. From here, Mike explained that Marcus Sheaves would present on some values in the area, followed by Adam King who would explain the outcomes of a number of processes applied to coastal zones alike to determine their success and suitability.

In conclusion, Mike focussed on an area within Victoria Creek that is starting to build up. Mark (resident) said that every flood, the growth and reduction of this build-up changes, 2014 in particular.

Adam King questioned whether there were any structures that could control the level of flooding on this system further up that may have changed over the years. Mark said that the structure changes every time it floods.

A resident added that levy banks between Victoria Creek and the Herbert River have been added in that have changed the course of water, and believes this has likely reduced the amount and velocity of floods within the Victoria Creek system.

Adam added that the less energy you have in a river system, the larger the deposition of sediment gets.

Overall, residents agree there is a lack of flushing of this system that is resulting in some sediment build up in the area.

Lynene (resident) added that the area in discussion used to be called the high bank, and she could once fish off this and personally believes the build-up and reduction of this area is from natural movement.

5. Marcus Sheaves, Professor – James Cook University

Marcus introduced his work that he has been doing the last few years, which includes research of the sand banks in the Hinchinbrook region where his team were involved in drone surveying of the marine areas in our surrounds.

Marcus discussed some habitats in the area, including mangroves, noting via imagery and graphs that demonstrate that 62% of the time, the water is in the mangroves, however the rest of the time, the water does not get in there.

The mangroves are good for storing carbon, which is good for the environment, adding that tidal flats (which are present in Taylors Beach) account for approximately 2% of the global coastal sediment carbon storage. Therefore, the tidal flats in the Taylors Beach area have values which are not really spoken about.

Aerial footage of tidal areas like Taylors Beach and surrounding sand flats was presented, including a large variety of sea life such as mangroves, sea grass, sea cucumbers, star fish, soldier crabs etc. and how various wildlife's presence/absence relates to the different tidal heights. Marcus noted maximum abundance of species is measured just above the low tide mark, where benthic predators cannot access these animals as food all the time, but then are quickly forced through the lower intertidal zone, or risk becoming food themselves to larger predators.

Drone footage was shown of sea life activity in the area; sting rays, trevally, mud crabs, showing where these intermediate predators spend their time.

Marcus explained that at high tide, the stingrays move up the beach to remain in the shallow and get away from predators such as sharks, which happens every day and occurs over the whole coast of Queensland. He also showed footage of stingrays mining the banks of the estuary to get the yabbies inside and proposed that this can have significant impacts in a localised area, causing erosion in some parts.

Marcus continued, advising that drones have been used to observe processes and sea life in coastal areas and noted there are a valuable additions to understanding what goes on in the Taylors Beach area.

6. Adam King, Senior Officer Environmental Operations Management – Townsville City Council

Adam introduced himself as the Senior Officer in Environmental Operations Management at Townsville City Council and his experience in observing coastlines since 1985.

Adam explained that in his time observing coastlines, he has seen a number of techniques that residents have used to try and manage coastal erosion, some of which consist of placing tyres, rocks, car bodies, bricks etc. on the beach front. However, tyres cannot be buried so this has created another issue with tyres spread all over our beaches, including at least 5,000 tyres on the beach at Cungulla where no coastal management work can be done as the tyres must be dug up and removed, which will cost millions of dollars. Further, items such as night soil bins, dating back to the 1900s, which were buried in the dunes to dispose of them are now being uncovered by ongoing erosion and tidal processes.

Sometimes coastlines change their orientation, meaning they go in and out, and sometimes they can change their environment. Adam presented aerial images of Toomulla Beach, which no longer has a beach and is now a saltwater creek mouth, due to the sand shifting, and the environment shows significant erosion. This means the residents now live on an estuary, not a beach.

Adam presented images at Saunders Beach where erosion is present, and the ocean and sand is shifting towards the front of established houses. Residents in this area were concerned with the recreational value in the area, with limited beach accesses and unsightly erosion. The scope for action to address erosion in Adam's experience is limited. He assists many private property owners with erosion issues, and much of his work is rectifying the causes of erosion with the residents who are able to provide financial contribution, as Council has no obligation to protect private land.

Adam explained that like the beaches he currently services in Townsville, there is more sand that leaves some beaches each year than what is replenished, often due to the obstructions involved with dams, weirs, rock walls and other manmade structures.

This means to save the beach; a source of sand needs to be found to replenish the beach. Buying and transporting sand is very expensive which is obviously not financially or environmentally sustainable.

Therefore, a nearby source of sand that is free and easy to move around to main a sand supply needs to be found.

Coastal erosion is a symptom of another big issue, often sand supply, exacerbated by land use practices and other erosion protection measures. People often patch erosion without understanding the cause, thus not fixing the problem, and often just adding to it.

Adam presented an image of large waves at Horseshoe Bay on Magnetic Island where the installation of a rock wall was an option, however this would not be practicable as not only would a rock wall fail in another large storm surge, but it would also need to be built so high that you would not be able to see the water from the existing land elevation.

The energy of the waves seen in the image resulted in a beach-building event, meaning it took all the sand from the lower beach, and dumped it at the top of the beach. This is climate change adaptation; the beach environment is adapting to the change in the climate, resetting the beach dune to be higher and further back than before, and rebuilding a storm energy reserve within the dune, which is there to dissipate the energy of the next big storm event.

It is the effect of storm surges and cyclones that pile sand up on the beach and are perceived as something that destroys the beachfronts and parks, however it is a good thing as it builds a new equilibrium with a higher beach and creates a new storm management reserve dune, which is nature's way of adapting to the changing conditions. However, in an attempt to 'reinstate' the beach as it was, we often use machinery to push this sand back out to sea to reinstate the original beach line, and then wonder why it erodes away.

Adam also explained that some erosion has nothing to do with the ocean and the waves but is a direct result of the landward practices undertaken by people on foreshores that undermines and prevents beach recovery. Although beaches are prone to erosion events, they have the ability to recover from erosion and build themselves back up, if just given the opportunity.

When it rains on a beach (or irrigation is close by), the water is meant to stay behind the top of the dune and soak into the ground within the swale. Most of the fresh water on the top goes through the sand. However, when you have a yard or park that have been improved with top soil and planted with couch or grasses where the lawn meets the beach, the water cannot get away because of the topsoil and thin layer of roots. Compacted topsoil is used to grow grass as lawn grasses do not like growing in sand. This layer of impenetrable substrate creates a concrete slab effect as the vegetation roots stay along the surface of the sand where water can be reached. Underneath the topsoil there are no roots, so in parks on the foreshore it acts like a sheet of glass, or just like concrete paths, when it rains, the water will run straight off, down towards the beach, thus causing erosion by head cutting.

However, the native grasses and vines (such as Birds Beak, as seen on Taylors Beach) on our beaches have horizontal rhizomes which grow horizontally on the top of the ground, so when the sand hits them, the sand falls into the gaps between and slowly covers them up. The plants then grow up through it and this process builds the dune up vertically.

The trees and vegetation are more important in the recovery of the dune between events when sand comes back to the area after a storm, where it can be captured by that vegetation to build up a dune at the top of the beach to keep them in the equilibrium. Our beaches cannot capture this sand when inappropriate land uses on top of or behind the dune are preventing or undermining this process, and therefore the dunes do not recover from storms and erosion, and just get chewed away again during the next event.

In Adam's line of work, he is attempting to transition the compacted soils in beach park areas, and transition these back to sand (which is what should be in that environment to allow water to go through it and not over it) and developing on-ground works and coastal system solutions. This reforming of the landscape includes adding in a porous paving material made locally in Townsville (Gough Plastics) that has a hollow grid underneath to allow water to go through the footpath, under the ground into the sand dune and eventually back out to the ocean.

Adam further suggested to plant native vegetation to create a buffer that protects our parks, demonstrating how and where this was done in Townsville, noting that it is not always easy to allocate resources and timing in accordance with favourable climate conditions.

Adam explained a current situation at Saunders Beach where residents were concerned with how close the ocean and shifting sand was to their front doors, showing examples of beach front fences being undermined. In this instance, Adam worked with locals on traditional approaches to build foreshores.

Assessments were done over a period of time on the distance between the houses and the beach front with little/no progress.

With some willing landholders, it was decided to trial letting debris from the sea collect on the beach front over time to assist in building the dune. Actions included installation of sand traps to catch sand at the top of the beach, planting of coastal vegetation, requesting residents to stop mowing the esplanade and not to plant lawn or landscaping grass on the esplanade. These actions grew the esplanade from 12.6 meters from the residents' front boundary to 32.6 meters in just six years, simply by changing people's behaviours and assisting the natural process of dune repair.

Adam explained that at Bushland Beach, a dune was built within the private properties where residents applied for the permit themselves. The residents then hired the respective Council to do the coastal recovery works, where residents had to abide by coastal planning obligations. It was noted that the residents in this area did not adhere to the requirements, and Council has since been requested to return to do all the work again, due to subsequent erosion.

Some further tips on building the dunes back are limiting the mowing above the dunes and leaving the driftwood on the beaches as it is a nutrient that re-establishes new seeds to grow in. Reference to Townsville City Council's Six Easy Steps to Grow Your Esplanade;

a) Let debris collect on the high tide line;

b) Install sand traps;

c) Plant native coastal vegetation;

d) Do not mow coastal vegetation or plant landscape grasses;

e) Use public pedestrian paths; and

f) Take your green waste to the tip, and don't dump it on the foreshore.

In closing, Adam reiterated that coastal erosion is a symptom and emphasised that focussing only on erosion is costly and usually a waste of time.

Instead, if you focus on promoting beach recovery between events, it is much cheaper and usually works. It is certainly a different way of thinking, and not how most communities think. Adam noted that the recovery of beaches does not happen overnight and requires education and ongoing involvement with and by the community.

Adam explained that a lot of the areas he demonstrated tonight are a little bit different to what is happening in Taylors Beach, however a lot of the principles are much the same and will also be taken to Forrest Beach tomorrow night, including vehicle impacts that prevent sand from going up on top of the beach, because of compaction on the sand.

7. Conclusion

Mike Ronan briefly summarised the meeting, acknowledging areas covered, including:

- The Taylors Beach system and how it came to be;
- Coastal processes;
- Insights from the community; and
- Problems and solutions in nearby coastal locations such as Townsville.

Michael Nash explained that this workshop is the beginning of the process and thanked everyone for their attendance and input. From here, the team will be working on an options analysis at a technical level and advice for Council.

Council will then come back to the community and look at some of the options for stabilising the area more permanently. As part of this process, there is a dedicated webpage on Council's website for those who are interested in keeping up to date throughout the life of the project.

Chris (resident) suggested that Council (through funding and collaboration with other coastal Councils from Mackay through to Cairns) could look at getting a sand dredge with a pump and run it up and down the coast to tune the natural events to overcome the problems we are experiencing.

Mike Ronan explained that there are CHAS's up and down the coast catered for each location's natural processes, noting where people are close to the coast, there is going to be an urge to do stuff.

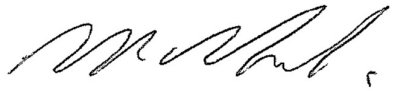
Adam King added that one of the easiest and cost effective 'fine tuning' methods is to take sand and replace it within its same system.

James Stewart added that we currently dredge within Taylors Beach itself, under the correct permits.

Mike closed with advising that there are still a lot of discussions to have, with the team working towards finding suitable options for each zone (which may work for one coastal location but not another) to finalise the development of the Shoreline Erosion Management Plan.

Michael provided words of thanks to the attendees and guest speakers for their support, contribution and facilitation of the session.

Meeting closed at approximately 9.15pm.



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