B Q6) SPM means: WG1 Summary for Policymakers.

SPM has various components.

SPM.3 Caters to multiple observed indicators of changing global climate. like - Variations in snow cover, arctic summer sea ice extent, Global average sea level change and change in global average of ocean heat content

SPM.4: These figures indicate the changing global carbon cycle with measurements in pCO_2 in Atmospheric and ocean surface components.

SPM 5: These figures estimate Radiative forcing.

Together, these figures provide a comprehensive view of the variability and the long term changes in the atmosphere, the ocean, cryosphere and land surface. They provide an overview about the emissions and drivers (which drive towards dynamicism in the system) and the indicators (which differentiate a changed system from an ideal one).

a) SPM5 explains that atmospheric drivers (because of largely anthropogenic reasons) have been changing. (wrt 1750 W/m^2) ~~1750~~. Examples are CO_2 levels, Halocarbons and oxides of nitrogen.

b) Indicators measure a changing global climate and attributes like Global Carbon cycle (SPM.4)

The trends in the SPM.3 and SPM.4 figures show that:

- The northern hemisphere spring snow cover and arctic summer sea ice extend have been steadily decreasing since 1900.
- The global averages of sea level and ocean heat content have been steadily increasing since 1900. The sea level has risen by 20 cm, (200 mm) which is a significant amount
- Atmospheric CO_2 levels have been on the rise since 1950.
- Radiative forcing estimates in 2011 show significant increase in CO_2, CH_4, N_2O and Halocarbon levels ~~since 1750~~ with VH confidence levels. Anthropogenic radiative forcing in 2011 has multiplied the levels of the above by more than a factor of 4 (since the 1950s). Hence, human influence on climate systems is very real and it shows in the SPM.5 figures.

B Q2) Monsoons are a very important aspect of Climate in India. They are characterised by consistent periods of rainfall throughout the country. They are instrumental in the Agro-based economy of India. However, these monsoons have increased in variability and potential hazard events over the course of time.

- Some studies have suggested that Indian monsoon in the desert areas of influence, has recently reversed its millenia long orbitally driven, slow frequency trend towards less rainfall
- RCM projections for climate change in India show positive trends of widespread warming (pronounced during winter and post-monsoon months)
- Although some models show a slight decrease in precipitation all over India during the first few decades (2030 - 2040 ~~2100~~), by 2100, they project an increase in the precipitation during monsoon ~~by 2~~
- One model shows that by 2050, the number of rainfall days in a year will decrease but the number of one-day extreme rainfall events (frequency) will increase
- The recent IPCC assesment shows that circulation associated with monsoon may slow down, but the moisture in the air may increase.
- ~~Pre~~ Summer monsoon precipitations in parts of South Asia will be reduced on average.

Hence, Climate models opine that Indian monsoons will intensify with a warming climate.

Impacts : . Food production and drinking water supply - leads to instances of loss of crop by farmers and increase water demand.

Human Health - Agricultural anomalies may result in the decline of human health.

Economic Growth / Development - India being a predominantly agro based economy will suffer greatly from variations in monsoons. Millions of farmers will experience immediate hardships and hunger because of less predictability and preparation. High input-high output agriculture will be impacted, the productivities will be impacted negatively, and will not bode well with increasing population and standard of living costs.

A2 Q4) The PAR model links vulnerabilities to unsafe conditions in a continuum that connects local vulnerability to wider national and global shifts in the political economy of resources and power.

It emphasizes the social conditions and root causes of exposure more than the hazard itself that generates unsafe conditions.. Social conditions may include demography, poverty levels, public health infrastructure and so on.

B1) The article on "Aleatory or epistemic" us of the following standpoint: Although it may seem trivial that the characterisation of uncertainty becomes a pragmatic choice dependent on the purpose of the application, it is not so. It is convenient to characterise uncertainties as Aleatory or epistemic within an engineering analysis model. This is because the lack of knowledge part of the uncertainty can be represented in the model by physical auxiliary variables. This heavily influences Epistemic uncertainties being modelled. Sources of uncertainty are recognised as Aleatory if the modeller does not foresee the possibility of reducing them. Hence, aleatory uncertainties can not be reduced while attempts can be made to reduce epistemic uncertainties.

Although an uncertainty might have both aleatory and epistemic components, the epistemic component can be assessed through sufficient experimentation. Through experimentation, changes can be implemented in order to refine our model of the system and this is how epistemic uncertainties can be countered with. Thus, it is of prime importance to categorize the uncertainties within a model, so as to make clear which components can be reduced, and which, not.

B

A 2) Q1) Holistic approaches aim to go beyond technical modelling to embrace a wider and comprehensive explanation of vulnerability. They differentiate exposure, susceptibility and societal response capacities as the cause of vulnerabilities.

A core element of these approaches is the feedback loop that underlines the dynamicism of vulnerability which is the main driver and determinant of risk.

A2 Q2) The approach of the IPCC fourth assessment report differs from the disaster risk management perspective because the rate and magnitude of climate change is concerned.

The concept of vulnerability here excludes external environmental factors of shock or stress.

This approach hence, considers the magnitude and frequency of potential hazard events while describing vulnerability.

A2 Q3) Because societies can transform nature and influence natural processes to a reasonable extent, human-environment systems can not be decoupled. These perspectives (Social-ecological) argue that the exposure and susceptibility of a system can only be understood if these coupling processes and interactions are addressed. Since changes in the environment affect social and economical systems, these perspectives can not be ignored

A1Q3) Although the IPCC consensus has many benefits, it has failed to produce a thorough potrayal of the complexities of the problem and the associated uncertainties in our understanding. The subjective consensuse expressed in simple terms is more easily understood by policy makers. However, it has been receiving continuous criticism by experts. Example:

Vander Sluijs 2010a: "It underexposes scientific uncertainties and dissent".

Moss_Schneider: "It deals with uncertainty in a very ad hoc manner".

Hence, the IPCC consensus may not enjoy encouragement from expert opion.

A1Q4) The factors that influence the complexity of the climate system are: • large degrees of freedom, • number of subsystems and the complexity in linking them, • nonlinear and chaotic nature of the components.

Naturally, our understanding of something as complex as a climate system is hampered by uncertainties, ignorance and cognitive biases. Computer simulations have been employed in the recent times to better understand it's complexity.

A1Q5) The author argues that scientific perspectives must not be completely dismissed while formulating the consensus. Scientific viewpoints and criticisms must be considered to improve the quality of the consensus. Else, it would make the policy vulnerable to scientific error and limits the political playing field. ~ Van-der Sluys (2010a.)

It is also instrumental that the policy makers understand the more extreme possibilities that the consensus may exclude or downplay ~ Oppenheimer Et al (2007)

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A1Q1) Better characterisation of uncertainty and ignorance and a more realistic portrayal of confidence levels could go a long way towards reducing the "noise" and animosity portrayed in the media that fuels the public distrust of climate science and acts to stymie the policy process. ~~It would~~

It would also promote better overall understanding of the science and how to ~~target~~ best target resources for better understanding.

It is also critical for the development of robust policy options

A1Q2) According to Van der Sluys (2010b), the IPCC consensus pays too little attention to matters on which no consensus can be reached., even though the decision is policy-relevant.

This may lead to overconfidence and may lead to over-emphasis of expected outcomes, and ignores the more extreme possibilities that is downplayed by the consensus.