Case study: River catchment at the local level The River Nar *3.1.1.6*
ANSWERS

Q1	***True or False?***	
A	The river Nar flows through the agricultural and low lying lands of west Suffolk	**False**
It flows through west Norfolk		
B	The river is a tributary of the River Great Ouse that discharges into the North Sea	**True**
C	The river is unusual in that it flows over chalk which is a permeable rock	**True**
D	Much of the course is a protected SSSI – Stream of Special Scientific Investigation	**False**
SSSI stands for 'Site of Special Scientific Interest'.		
E	The river has little variation in its flow giving it a low index of flashiness	**True**

Q2	**Match each acronym (abbreviated name as letters) to the correct description**	
A	A strategic policy by large institutions to ensure they act for more than profit	**CSR**
B	A local area designated for particular protection from development	**SSSI**
C	A metric area that measures land in squares	**km2**
D	A global organisation for protecting natural environments and species	**WWF**
E	An area with concerning fertiliser runoff into surface/underground waterways	**NVZ**
Select from:	**WFF** **NVZ** **SSSI** **CSR** **km2**	

Q3	**One sentence is incorrect in each of the explanations below. Identify the wrong one.**
A	The River Nar flows for 42 km before entering the River Great Ouse. It commences as a series of springs on chalk and descends 60m over its course. ~~It flows over chalk geology for its entire length making it a rare chalk stream.~~
It starts off flowing over chalk, but later on the R. Nar flows over sandstone and clays.	
B	The area drained by the River Nar is three-quarters arable agricultural land. ~~This means the river banks have no need of protection from damage by pastoral farming.~~ One specialist crop which requires very pure, fresh water is watercress that is eaten raw and used to be grown in fields using water from the river.
Cattle graze on fields adjacent to the river channel and have damaged the river banks, requiring action	
C	~~One of the main threats to the river water is gravel and sand extraction which releases slurry into the water that can lead to algal blooms.~~ This is the rapid growth of water algae stimulated by additional nutrients in the water. This is particularly serious after intense storms which can wash considerable sediment into the channel.
Pig farming releases slurry, not gravel and sand extraction. Slurry is liquid waste from farm animals.	
D	Human use of the River Nar includes tourism, particularly freshwater fishing. This can provide a valuable economic and social input into the local economy. ~~A Coca-cola plant is also located near the river and allows tours of the plant as part of their responsibility to the local community~~.
Coca cola is investing in river protection in Norfolk but doesn't have a plant on the River Nar or Norfolk	
E	In its early course on chalk much of the water is sourced from the groundwater emerging at the surface. ~~This is supplemented by high annual precipitation which causes high base flow after severe storms~~. Despite flowing over chalk the water is not as pure as it might be due to surplus fertilizer being washed into the river from fields.
Annual precipitation is low on the east side of England. High base flow is from underground sources	

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Q4	**Study the list of potential threats to the River Nar and identify them as 'natural' or 'human' threats. If you consider some to be 'both' – explain why.**

Natural threats	***Human threats***
Precipitation variability *(could be argued it's due to human induced climate change)* **Acid rain** *(naturally occurring – but could be argued human emissions intensify it)* **Falling water table** *(may be due to human induced climate change)* **Limited tributaries (***climate changes quickly transferred to the river system)*	**Cattle farming** **Nitrate runoff** **Fishing** *(lead weights & 'bread bombs')* **Algal blooms** *(a natural event but intensified by slurry/nitrate runoff)* **Slurry** **Abstraction**

Cattle farming ***Precipitation variability*** ***Nitrate runoff***
Acid rain ***Falling water table*** ***Fishing*** ***Algal blooms***
Limited tributaries ***Slurry*** ***Abstraction***

Q5	***How should the River Nar be managed in order to be a 'sustainable' river system for the next 50 years, considering the likely changes it is likely to experience? Classify as 'Essential', 'Important', and 'Desirable' considerations.***

Essential:

- **Limit water abstraction as falling precipitation is likely to reduce the input of water into the system.**
- **Monitor and ensure farmers use nitrates responsibly to avoid surplus runoff**
- **Monitor and ensure pig slurry doesn't get into river system**

Important:

- **Monitor rising sea level and inundation of lower course of river Nar by saline water**
- **Monitor water table and reduce water abstraction by surface bore wells if necessary (particularly by arable farmers in dry summers)**
- **Monitor gravel extraction and ensure sediment doesn't flow into the river after periodic flooding**

Desirable

- **Monitor tourist uses of the river to reduce any negative impact from over-use**
- **Encourage farmers to ensure pastoral farming does no further damage to river banks**
- **Monitor species variety and prevent colonisation by non-native species**
- **Advertise the environmental actions by Coca cola and encourage other organisations to carry out similar restorative work.**