Final Project Report (to be submitted by 30th September 2016)

Instructions:

- Document length: maximum 10 pages, excluding this cover page and the last page on project tags.
- Start with an abstract (max 1 page).
- Final report text: Do not forget to mention your methodology; the people involved (who, how many, what organization they are from – if applicable); and the expected added value for biodiversity, society and the company. Finally, state whether the results of your project can be implemented at a later stage, and please mention the ideal timing and estimated costs of implementation.
- Annexes are allowed but will not be taken into account by the jury and must be sent separately.
- Word/PDF Final Report files must be less than 10 MB.
- If you choose to submit your final report in your local language, you are required to also upload your final report in English if you wish to take part in the international competition.
- To be validated, your file must be uploaded to the Quarry Life Award website before **30th September 2016** (midnight, Central European Time). To do so, please log in, click on 'My account'/ 'My Final report'.
- In case of questions, please liaise with your national coordinator.

1. Contestant profile

▪ Contestant name:	**Kim Svetlana**
▪ Contestant occupation:	**Biology teacher**
▪ University / Organisation	**High school named Panfilov**
▪ E-mail:	
▪ Phone (incl. country code):	
▪ Number of people in your team:	**Goncharenko Vitaliy (+7 (777) 8218000)**

2. Project overview

Title:	STABLISHMENT OF FISH FARMING LAKE, CONSTRUCTION OF ECOLOGICAL TOURIST ZONE
Contest:	the Quarry life award 2016
Quarry name:	Baltabay
Prize category: (select all appropriate)	☒ Education and Raising Awareness ☒ Habitat and Species Research ☒ Biodiversity Management ☐ Student Project ☒ Beyond Quarry Borders

Environmentally friendly fishery

The project is directed to rational use of a career: constructions of a fish farm of increase in a biodiversity, gardening, construction of the tourist area. The fish farm implies the commercial benefit directed first of all to payback of the means spent for the creation, self-sufficiency and expansion. During research project stage, our team came to a conclusion – creation of one reservoir will be pernicious for fish, in the investigation - it is impossible. Having analysed scientific works of Zooengineering faculty of the Moscow Agricultural Academy of Timiryazev on cultivation of salmons, fish industry, having visited several fisheries in Almaty region, relying on experience of the European trout farms - came to change of the concept of the project. From the obtained data and experience of the operating fish farms, the received concept which is the most acceptable is below included. At the moment observation of an experiment isn't ended, the complete cycle is calculated for 17 months, from them 7 months are passed. Observation is performed in fishery of Almaty region. Experience of the manufacturer more than 20 years, he is the main consultant of our project.

Concept of construction of a farm

• Pond sizes.

The pond sizes for the maintenance of a trout shouldn't be big: it is better to have several small ponds. The best ratio of width and length of a pond is 1 — 1,5:5. So, the pond 40 m long has to have width of 8 m. factual Square depends on the available amount of water and, naturally, on the area

• Pond form.

An important role is played by a form — an outline of the coastline of a trout pond, i.e. the artificial habitat has to remind them natural. Thereof all trout ponds irrespective of, are them earth ponds or the concreted channels, are extended in length as sites of a stream, and intensive cultivation of a trout in them depends not so much on material of which the pond, how many from quality and amount of water in him is constructed. All the rest depends on local conditions. So there are trout farms which are organized on the place of a stream abounding in water with pebble soil. Instead of natural coast in such stream the concreted walls somewhat reminding "installations with a longitudinal current" are made.

• The concreted channels.

In America and France there are such farms in which the concreted channels (the bottom is also concreted) are located a row and feed from one head channel located to them perpendicularly a ledge, and the used water arrives to the cross canal at the basis again. These constructions will far be spaced from a natural trout stream, but concerning hygiene, technology of distribution of a forage, a round-up and sortings, preserving purity and a dosage of water they have advantages before others. About health of fish in such installations it is possible to judge by her surplus.

- Pond bed bias.

The pond bed bias in the longitudinal direction has to make 0,01 — 0,02, and the bias to the central trench serving for a round-up has to be more. Slopes of a pond or a dam if they rather sloping are also made of concrete, have to have a ratio 1:1. External slopes, i.e. the dry party of a dam, have to be put in the ratio 1: 1,5.

- Dam crest width.

Width of a crest of a dike shall be passable for a load carrying transport, i.e. the minimum width shall be 4,5 m. It is the best of all that every second dike between ponds was passable and each pond at least from three parties was available to loading and unloading of vehicles. For small three-wheeled machines on which to ponds or fodder automatic machines bring a forage and which, loaded with tubs, also serve for domestic transports width of a crest of a dike shall be 2 — 2,5 m.

- Water intaking head construction

The amount of the arriving water is regulated by a small gate board in the water intake on the bank of the trunk channel or a distributive trench. In more small-scale enterprises where access of flowing water is limited, dependent water-supply is used, water comes from one pond to another through a overflow pipe which settles down over pond level at the height at least 30 cm that the falling water could be saturated with oxygen in addition.

In a case or an oxygen deficit the trout becomes very uneasy and is easily injured about a pipe edge. The piece of an inner tube fixed on the end of a pipe protects fish from damages, but also, as a result of oscillations of the camera water is in addition aerated.

For reset of water simple water drain pipes or ground floodgates through which only surface water is led out serve. It is especially important in trout ponds as from them the surface water heated by the sun is led out, and more cold water remains in a pond that is very favorable for a trout.

As the healthy trout goes on the current, fishes can leave one pond in another if floodgates don't have protective grids. Best of all proved cylindrical lattice nozzles which have a big surface for water pass, but rather narrow distance between rods hindering an escape of fish.

- Devices of ground floodgates.

Floodgates, first of all, serve for descent of a pond. They have one general constructive principle, namely: the vertical row causes a sandor a subtime, and the upper edge of the top sandor forms a spillway crest.

Often, before a row a sandor on all height of a floodgate insert a lattice. As a result deposits which could litter a lattice remain on a surface. Service of such floodgate within almost all year comes easy. Only at a leaf fall or at strong blossoming of seaweed, and also during a haymaking the lattice needs to be examined and cleared several times within a day by means of a rake or a mop. Thus, in a floodgate there shall be two couples of grooves: one — for a sandor, and another — for the lattice inserted before them.

In trout pond farms for bigger availability ground floodgates build closely to a dam. They can be vertical or inclined parallel to a dam slope. The last design has that advantage that its mesh surface increases in comparison with vertically standing floodgate some more and floating deposits nestle up.

Depending on use purpose (for whitebaits, fingerlings, commodity fish and producers) trout ponds differ on the area, depth and pro-accuracy.

- The bringing channel

Sometimes producers are placed in the bringing channel in which they find the conditions closer to natural.

Do it in exceptional cases, for the sake of growth and health of producers.

Usually in the lower part of the bringing channel before implementation place commodity fish for improvement of her tastes.

- Chemical composition of water

Water suitable for fish breeding has to correspond to the following indicators:

saturation of oxygen is higher than 80%

• pH 6,5 – 8,2 (7,5-is optimal)
• BPK5 no more than 4 mg/l
• oxidation to 15 mg/l
• content of iron is up to 0,5 mg/l
• content of ammonia is up to 0,2 mg/l
• content of carbon dioxide is up to 5 mg/l

water temperature

Optimum water temperature for an iridescent trout makes 14-18 degrees.

amount of water

The following factor which determines productive opportunities of projectible economy is the amount of water. Establishment of the minimum quantity of water together with assessment of its quality and temperature does possible determination of the size of the area of ponds for cultivation of a trout.

For cultivation of one ton of commodity fish, in the "critical" period of high temperatures i.e. in July - September it is necessary to provide from 5 to 15 l/sec. of water in case of maximum speed. 15 and 22 degrees.

oxygen content

("Calculation of oxygen balance" the table in addition)
Is accepted that the trout uses only 40% of oxygen from water. Is accepted that at a temperature of 20 degrees oxygen consumption:
• for a commodity trout makes 0,06 mg of O2/of kg of fish in sec.
• for a whitebait - 0,1 mg of O2/kg of fish in sec.
• for producers and repair herd of 0,04 mg of O2/kg of fish in sec.
Calculation of mass of the fish who is grown up in case of a certain consumption of water
G = Q * Z O2/
• G – mass of fishes
• Q – a water consumption in l/sec.
• O2 – the available content of oxygen of mg of O2/l
• Z-consumption of oxygen in fish/sec. O2/kg mg

Trout iridescent

Oncorhynchus mykiss - salmo irideus
Family: Salmon
Sort: Pacific salmons
Type: Checkpoints
Length of 50 - 90 cm, weight to 2 kg, is more rare than 6 kg. Differs from a creek trout in longer body, a sinuate tail fin, a wide iridescent strip along a sideline, absence of red spots on a body. In a back fin 4 not branchy and 9 - 10 branchy, in anal respectively 3 and 8 - 11 beams. Scales small, along a sideline of 136 - 148 scales.
Many scientists consider an iridescent trout a fresh-water form of the Pacific stalnogolovy salmon (salmo gairdneri). Under natural conditions the iridescent trout lives in fresh waters of the Pacific coast of North America from Alaska to the southern Oregon. Since the end of last century this valuable fish is acclimatized in Japan, Australia, Tasmania, New Zealand, South Africa, on Madagascar and in some other places of the globe. In Western Europe it is a mass object of pond fish breeding, is acclimatized also in some rivers.
At an adult trout the iridescent strip along a sideline because of which fish has also received the specific name is especially brightly painted in violet and red colors during spawning. The body and fins of fish are covered with numerous dark specks.
The iridescent trout - the inhabitant of pure cool waters, however in comparison with a creek trout transfers water temperature increase much better. For her growth and development the water temperature of 15 - 20 degrees (at lower vital processes slow down) is optimum. She is a little less exacting and to the content of oxygen in water. Reaction of a trout to light is very peculiar: she doesn't take out bright solar lighting, hides in a shadow, under stones, snags, leaves on deep places, she doesn't transfer, however, and full blackout. The iridescent trout in cloudy days, in evening and morning hours is most active. Unlike others the openbubbled fishes (who have a swimming bubble it is reported with a throat) continuous access to a water surface is necessary for it for filling of a swimming bubble atmospheric air. Therefore in the closed cages entirely shipped in water, and also in tightly the reservoirs freezing in the winter it can't live
Puberty comes at females on the third year of life, at males a year earlier. Unlike creek, spawning at an iridescent trout under natural conditions takes place in March - April, and development of caviar lasts up to 1,5 - 2 months, depending on water temperature. Fertility makes about 1,6 - 2 thousand berries on 1 kg of mass of fish. Caviar large ground, not sticky, diameter of berries is 4 - 6,5mm.
After a hatching from caviar whitebaits long time live at the expense of content of a vitelline sack and only in 1 - 2 weeks begin to pass to independent food with small zooplankton. Adult individuals eat the most various animal organisms - from small crustaceans, larvae of insects to small fish. Food at the expense of

the insects falling in water is of great importance. Very easily this fish adapts to new food, as formed a basis for its pond cultivation with use of artificial fodder mixes.
The iridescent trout quicker, than creek grows. In case of cultivation in ponds growth strongly fluctuates depending on conditions of feeding and a graziery. Usually two-year-olds reach the weight of 350 - 450, three years of 1 - 1,2 kg, a four year of 2 kg and more.
The iridescent trout is of great economic interest to pond fish breeding and as subject to cultivation together with a carp. In many countries of the world she is grown up in cages, lands to small small rivers and lakes for industrial and amateur fishery. Its meat is unusually tasty and everywhere highly appreciated very much thanks to what in many countries of Europe the close attention is paid to its production. The conventional centers of trout-breeding are Denmark, France, Italy in which 140 - 180 thousand centners of this fish are annually grown up. Experience showed that in case of high degree of an intensification in pond trout farms it is possible to receive up to 300 c of commodity fish from blue hectare.

Cultivation of an iridescent trout

Spawning of a trout

• The iridescent trout ripens at the age of 2 years (male) and 3 years (female).
• A fertility of a trout - 1200 – 1500 pieces of calf/kg of body weight of a female
• Now it is possible to receive trout calf from September to May, and to import calf all the year round.
• Readiness of a female for spawning is checked by each 7 days

Calf capture

• We lull fish, we wipe and we shift in an empty bowl, we merge good calf in the general bowl
• We fertilize calf of 10 - 15 females milts of 10 - 15 males
• We mix, we water, we leave for 5 - 10 minutes.

Caviar incubation

.After capture of caviar we place it in device capacities – caviar has to receive waters in number of 24 l/min. on 100 thousand berries in the beginning, then – to 50 l/min.
• Water temperature is 4 – 10 degrees.
• Time of an incubation is 340 degreeday

Incubation

• During an incubation we choose dead berries.
• When there are larvae, they are transferred to trays and begin to feed.
• At the beginning density of landing shall be about 10 thousand pieces on 1 sq.m of a tray and the consumption of water is established within 10 – 40 l/min.

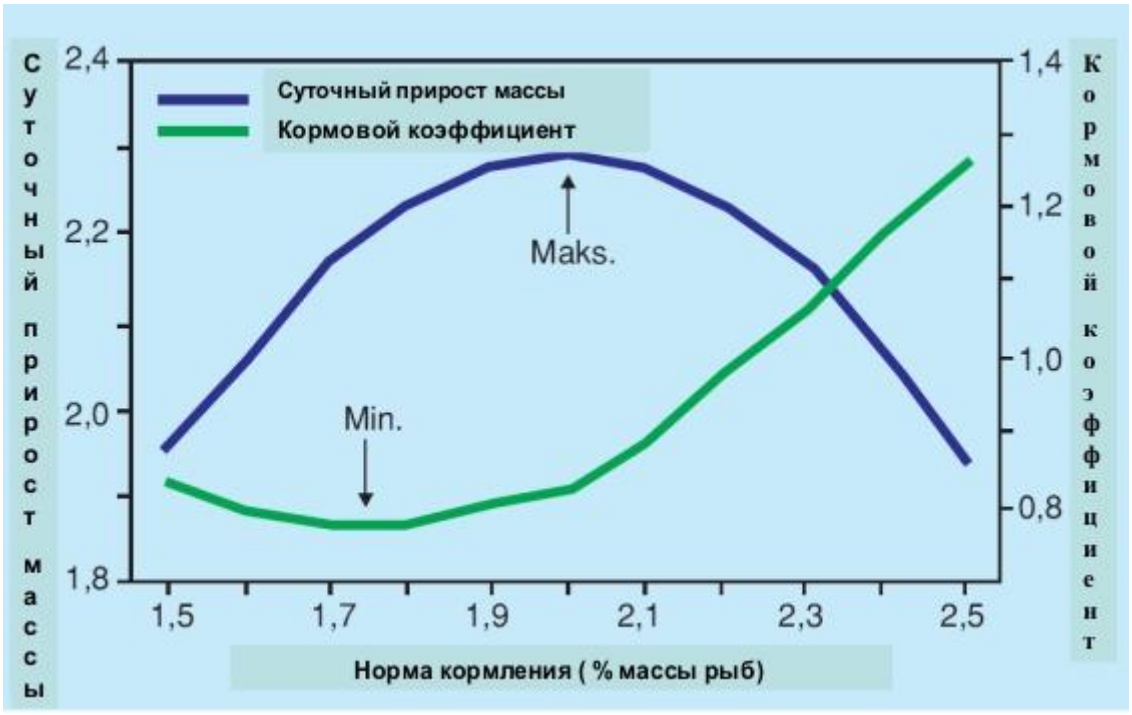
Cultivation of larvae

• Temperature shall be above three degrees Celsius.
• A larva we feed 8-12 times a day and gradually we reduce feeding frequency.
• Pools for cultivation of larvae need to be cleaned daily.
• During growth of fishes it is necessary to carry out sorting.

Water (in liters) necessary for trout kg. At different temperatures and frequency of exchange.

Water temperature	Water in liters									
	Exchange frequency in a minute					Exchange frequency in a minute				
	60	30	15	10	5	60	30	15	10	5
	Whitebait of 3-40 g.					Fishes more than 40 g.				
7	44	22	11	7	3,7	20	11	5,5	4	1,8
10	72	36	18	12	6	36	18	9	6	3
12	90	45	22,5	15	7,5	46	23	11,5	7,5	3,8
14	120	60	30	20	10	60	30	15	10	5
15	134	67	33	22	11	66	33	16,5	11	5,5
16	152	76	38	25	13	78	39	19	13	6,5
18	180	90	45	30	15	90	45	22	15	7
20	228	114	57	38	19	114	57	28	19	9
22	284	142	71	47	24	144	72	36	24	12
24	360	180	90	60	30	180	90	45	30	15

The size of a day dose of a forage depends from:
• mass of fishes
• temperatures
• size of fish
• forage caloric contents
Knowing these parameters, it is necessary to use the fodder table from which it is possible to receive a dose in % of weight. (fodder table)
Art of feeding consists in finding "golden mean" between quantity of a forage which guarantees growth, and fodder coefficient (kg of a forage/kg of a surplus of mass of fish). Than this coefficient, especially a high-quality forage is lower. It is important because forages constitute more than 50% of expenses in case of cultivation of products.



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daily weight gain(purple)
feed coefficient(green)
feeding rate(percents of fish weight)

Cultivation of juveniles and commodity fish
• The juveniles are fish from 0,5 g to 80 g
• Density of landing is from 10 - 40 kg/m3. The more fishes, the are higher than the requirement to pro-accuracy and quality of water
• At first we feed 6, then 3 times a day.
Commodity fish breeding
• from a whitebait to weighing 350 - 1000 g and more
• density of landing is up to 90 kg/m3
• feeding 3 times a day
• periodically it is necessary to sort fish; at least one day before sorting - not to feed fish.
Prophylaxis
Every day it is necessary to watch a condition of fishes, first of all during feeding. Small appetite - a signal for the fish breeder of need of an intervention in technological process. When it is impossible to define etiologies – the intervention of the competent veterinarian is necessary.
Preparation for sale
Before realization, slaughter or transportation the esophagus of fish has to be empty. For this purpose it is necessary to stop feeding in three days with transfer of fish to the pure pool.
Transportation of caviar and fish

• The impregnated caviar is transported in containers with water, however not later than within 10 hours after fertilization. Caviar at a stage of a peephole is transported without water in insulated containers.
• Larvae and whitebaits - in sacks with oxygen.
• A large number of whitebaits, commodity fish - in containers with oxygen

Requirement of water and oxygen in transit a larva and a whitebait in bags (time of transportation of 12 hours)

Material		Water temperature		
sort	quantity		water	oxygen
larva	1000 piece	1-5	2	3
		above 5-10	4	6
Whitebait	1 kg	1-5	12	18
		above 5-10	16	25
		above 5-10	20	35

Requirement of water (l) in case of transportation of 1kg of fish in containers with oxygen

Type of material	Water temp.	Time of transportation (h)									
		2	4	6	8	10	12	14	16	18	20
		Water (in liters)									
Whitebait, salmon, iridescent trout, bull-trout	1-5	8	8	9	9	10	10	10	11	11	12
	above5-10	9	9	10	10	11	11	11	2	12	13
	above 10-15	10	10	11	11	12	12	13	14	14	15
Whitebait of an iridescent trout producers of a salmon	1-5	7	7	8	8	9	9	9	10	10	11
	above 5-10	8	8	9	9	10	10	10	11	11	12
	above 10-15	9	9	10	10	11	12	12	13	13	14
Repair and producers of an iridescent trout	1-5	6	6	7	7	8	8	8	9	9	9
	above 5-10	7	7	8	8	9	9	9	10	10	11
	above 10-15	8	8	9	9	10	11	11	12	12	13
Whitebait of an iridescent trout	above 15-18	15	17	19	-	-	-	-	-	-	-

The first project stage

A certain level of depth of a pit – no more than 11 meters is necessary for us for implementation of the project. During research project stage, to us was plans of the company for quarrying are read. The planned pit depth ~ 65 meters deep into is sounded. It creates some difficulties. For implementation of the project, it is necessary to raise bottom level, to necessary level under building.

In the second stage of implementation of the project creation of 25 manned reservoirs is planned. The sizes of 4*21 meters where 4 meters – pond width, and 21 meters are the length of a pond. Depth of a pond is 2.8 meters. Bias of a longitudinal bed 0.02. A bias of a cross bed to the central trench 0.003. Water level 1.8 meters. Height of an affluent pipe over a water surface 0.5 meters. Diameter of an affluent pipe ~ 30 cm. Pool walls concrete, 0.5 meters thick. A bottom concrete, filled up with a sand-and-shingle layer. Dam height 3 meters, width of 4.5 meters, is equipped with lock and drainage system. Ponds settle down in pairs: distance between two ponds 3 meters, distance between couples 5 meters. In turn 21 pools are located parallel to a natural geographical bias of the area (parallel to a watercourse). Four pools are located

The second project stage

Water intaking head construction. The water intaking construction equipped with lock system will send a water flow on the main channel to the canal the distributor. The channel the distributor is located perpendicularly production ponds, one level higher and is a source. The difference in height is necessary for water supply in ponds under pressure that in turn promotes aeration.
Diversion channel. Water, passed, passes through ponds to the diversion channel which in turn goes back to the river.
Construction of the covered incubatory complex, construction of economic constructions, constructions of a tourist complex, a territory upclassing is necessary (planting of trees, having sat down herbs, asphalting of a parking zone, a laying a stone blocks of pedestrian zones and terraces of a table zone, installation of benches, ballot boxes, the creation around territories a fence). The project embodiment in life it is possible after the end of raw production of a pit. The miscalculation of finance costs on a construction of a fish farm, purchase of a whitebait for cultivation, designing of recreation facility, purchase of a construction material is given below. The detailed miscalculation of construction costs of a complex and designing of a tourist complex, we leave behind the company. Attracting investors for these purposes is possible.

Time spent for creation of a farm ~ 49 months. 4 main stages some of them possibly are below included to make at the same time.
1 stage ~ 8 months - a bottom level raising up to the depth necessary for us
2 stage ~ 4 months - a farm construction
3 stage ~ 6 months - a construction of the incubator station, start of a whitebait in ponds
4 stage ~ 38 months – a maturity cycle of a trout (from a larva – a viripotent individual)
The rough estimate of project cost by our calculations constitutes: 2 636 391 800 tenges.
Calculation on lease of 30 lorries with a loading capacity up to 40 tone, amount of 14,9 cubic meters. Salary 90 000 тг / month. The 8th hour working day, 2 hours on delivery and a raining of ballast in a pit. The 26th day work in a month. 8 months of work.)
~ 43 200 000 tenges.
Ballast cost:
~ 2 507 346 800 tenges.
The cost of 700 tenges is taken for cubic meter, the required amount is calculated by a formula of amount of the equilateral truncated pyramid proceeding from the area of a pit ~ to 20 hectares, the planned depth – 65 meters, and a tilt angle of walls of 35 degrees. The amount, is approximately equal 3 581 924 cubic meters.
Calculation of a construction of a farm. The cost of a construction material, 8 hour days, 3 excavators, 10 lorries, one tower crane, 130 builders, the black earth, the necessary incubatory equipment, forages, fish on cultivation, 700 saplings of trees, grass seeds is taken,
~ 43 845 000 tenges.
Construction of recreation facility, table zone, parking zone, upclassing of the nearby territory
~ 42 000 000 tenges.

Costs can be lowered, due to activities of the company as they are producers of required materials (ballast, cement, sand, gravel etc.)
Our project, will provide growth of a biodiversity, will set an example of resource management, will create workplaces, will make a contribution to creation of the healthy nation. A fish farm – an excellent object, in education. Holding an excursion for school students and students. Enrollment of students for passing of a rate of the practical training directed by educational institutions. The grown-up commodity fish, we plan to bring to the Kazakhstan market. For the first cycle we plan to deliver 10 tons of commodity fish. To place in large supermarkets aquariums with live fish – as one of methods of sale of fish.