

1 **Green Design**

2 **From Theory to Practice**

3 **The Jerusalem Seminar in Architecture**

4
5 **Opening Remarks: Dr. Ken Yeang**

6
7 Thank you very much Arthur, It took a while for my mother to recognize that
8 she loves me, eventually she said that she loved me

9
10 I want to thank Arthur and ran for inviting me to try this event. This
11 momentous event. You don't realize how important this event is.

12 I want to thank the Rothschild foundation, for Madam Rosenfeld Rothschild,
13 for working with us on this, and for being here, and for overseeing on behalf
14 of the board.

15 I want to thank Meir for being here, and I want to thank all the speakers that
16 are putting great efforts on being here. I just want to, first of all to recognize
17 them, I'm going to read out their names, and I would be grateful if you could
18 stand up to be recognized.

19
20 The first is Michael McDonough, from New York., Simos Yannas, from
21 London, David Lloyd Jones from London, Stephen Behnisch, Professor Lam
22 Khee Poh, Michael Pawlyn, Elma Durmisevic, Bert Gregory, Steven Strong,
23 Nadav Malin, and Thomas Herzog.

24
25 In many ways, when I speak in public, in reality I'm speaking to myself.

26 I am questioning what I'm doing, and today is a unique event for me because I

1 Am going to talk about green design, and how I've started to re-think green
2 design.

3

4 The professions that you have here, are expressing on field, and that although
5 the event today and over the next few days, you'll listen to it, and it may be
6 forgotten, but the event will not be, it will be recognized and identified and
7 published in the documentary which will be on the website and in a book.

8

9 You cannot realize how important this book is. Because to those of you how
10 are architects, will remember the exhibition in New York, sometimes in the
11 late 30's, created by Fred Johnson.

12 Not many people attended the exhibition. But the catalog of this exhibition on
13 Modern movement, became, if you like, the bible for architects, for the next
14 30 years.

15 This event will not happen if we didn't have the support of the Rothschild
16 foundation, to bring this unique group of people together.

17 And the book of the proceedings of this event, I believe, will be ground
18 breaking, and will influence ecological architecture and design for a long time
19 to come.

20 You are, right now, in a momentous time in this field.

21

22 I am going to talk about green design and that, different ways of looking at
23 green design.

24 In many ways, green design stood in this infancy, and today I am going to talk
25 about how I re-thought about it, and I'm going to present to you four
26 propositions, I think green design is and could be.

1 The first idea that I have of this green design is the blending of 4 armatures.

2

3 Now, many architects, Every time I pick up a magazine, I see an article on
4 green architecture, and by some themes, I could reclaim, that he has done the
5 ultimate in green buildings.

6

7 I believe that a lot of the work that architects do today and engineers do today
8 are important work.

9 I used to experiment towards the green architecture, but I don't think we have
10 reached; we are enabled, to build the ultimate green building yet.

11

12 And for many architects and engineers, they see architecture as engineering.
13 They stuff the building with portable takes, they stuff the building with solar
14 collectors, with water recycling systems, with living machines and so forth,
15 you haven't been architecture.

16

Yes I think these are important systems.

17

But that's not the end for green architecture.

18

19 So I called this the gray Infrastructure.

20

The engineering systems, the eco-technology, the eco-gadgets, the eco-utilities
21 the engines have come up with, and that having some of these architects, I call
22 this the gray infrastructure, of the engineering Infrastructure.

23

And most green buildings have these in them.

24

25 This is a small project that we're doing in London, which is an extension to the
26 great Ormond street for children's hospital, and in phase 2A you can see the

1 corner of the building facing Guildford street, and what it has is a number of
2 green features, that is this huge flues chimney, at a corner, that over the mid
3 seasons, in spring and autumn, there's natural ventilation, in some of the rooms
4 and into the café in the ground floor.

5
6 This is a list of the green engineering features in almost everything in it
7 because as you know in the UK, you have to go through Camden, through
8 authority, and this time we had to go through cape, we had to go though
9 English heritage, and finally we had to go though the mayor of London- at the
10 time it was ken Livingston.

11 and in every stage each of these authorities will impose a requirement,
12 agreeing come on the project and hear the architecture building which cannot
13 be stuffed more with green engineering than this building, it's been rated on
14 the BM which is a British version of LEED, on 77%, so by all means this is an
15 excellent rating an probably when it was built, the greenest building, the
16 greenest Hospital, sorry, in UK.

17
18 The second Infrastructure is the green Infrastructure. Nature has it's own
19 Infrastructure.

20 Many of us don't see it when it takes place, in a patch of green, a lot of
21 activities in the soil, the producing of energy, photosynthesis, there are
22 organisms, and microbes, and different trophic structures, different states of
23 succession and so forth.

24
25 I call this nature's utilities. Nature has every right to be in existent as we have.

1 And I contend that the green infrastructure should be as prominent as the gray
2 infrastructure. If not more.

3 And so the second infrastructure is the green infrastructure.

4

5 To illustrate this, this is the master-plan that we just completed in India and
6 you can see the green infrastructure that stretch across the site, on a south
7 there's the forested land nature reserved, and this is the green infrastructure
8 which is continues, which is linked to the forested land the stretches across the
9 site.

10

11 Continues is extremely important because continuity is part of nature, in
12 nature everything is linked. And if this is not linked then they're patches of this
13 part green.

14

15 And so connecting to this structure, the first proposition, is the blending of
16 these 4 infrastructures. The gray, the eco-engineering, the green which is
17 natures utilities, to blend with this water management and drainage, and the
18 fourth is the red, which is not just a built environment and a heart system, but
19 also, a regular tree systems for rules and regulations and the laws that control
20 the land, and so gray infrastructure if you like, to composite all these four, and
21 the armatures because within these things change, engineering change
22 engineering develops, so does the nature, and so does water systems.

23

24 So here it is the idea of the four infrastructures. The green the blue the gray
25 and the red, and if you close up you can see the gray, the green and the blue,
26 and the red.

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Then I thought to me, and then it occurred to me, what happens if you flip this vertically? And so as an experiment we designed this building in New Delhi, and here you are the green infrastructure starts from the ground, gramps up, and moves its way to the top of the building, so this is the green infrastructure and within this are the other systems.

That's a ground floor plan for this building, you can see the drop off from the right, reception in the middle, elevated, and around from the back.

This is the infrastructure that clamps up from the back of the site through a ramp and in the front part of the site, in a continuous way.

This continues is an extremely important because otherwise they're just patches of green.

First floor on the left side with the auditorium, and second floor and on the right side is the tip of the floor, and what is in the red boxes of the green infrastructure, that we used on the top of the building both in the front and in the back of the building.

This is a scheme that we designed Macao and you can see the green infrastructure, this time not only goes across the site but it crosses over the highway into the hinterland and up the road.

Another version of this is the scheme that we just designed in Vancouver, by the water front and this is the seventh house altogether, each house faces the water front.

1 Because of the cold climate, the green infrastructure has to climb up in close
2 space and not to be open to the sky, and here you can see green infrastructure
3 from the ground, climb up in the pattern up the building, and in between it
4 would be the sky cots, but what you see in between the towers are green
5 bridges as well, so they connect not just at the ground plane, within the
6 buildings, but also between the buildings at the tower levels.

7

8 And this is green infrastructure at the ground plane, that's a retained podium of
9 two stories, with a park on top of it, which is linked to the boulevard, in the
10 front and the water front.

11

12 Another scheme in Istanbul, and this time you can see the water management
13 pool, the retention pond at the bottom of this plan, in the sliver, in this blue
14 sliver, and here we use ramps, that brings the vegetation from the ground up
15 the size of the building, up the balls and to the top of the building.

16 And here's the green infrastructure, and there you can see the eco-cells on the
17 right, in the middle, because it went down to the basement.

18

19 So, well, that's the first idea, eco-design is the blending from armatures, the
20 gray the green the blue and the red.

21

22 The next idea that I have on green design is one of bio integration.

23 In principal if we are able to bio integrate everything that we make and
24 everything that we do, as human beings in the natural environment, in a
25 seemingly benign way with the natural environment, there won't be any

1 environment to promise at all because this is easier said than done, achieving
2 this is the single biggest challenge confronting us as designers today.

3
4 This bio integration I see in 3 levels.

5 At a physical level, sustaining level and temporal level, and I'll explain this in
6 a few minutes.

7 Now here's a poor judgment with different things, artificial things that patch
8 this body.

9
10 These are prosthetic devices, prosthetic systems, and prosthetic components.

11 In many ways what we do as architects and designers and engineers, is very
12 similar to what sergeants do in attaching and designing prosthetic systems and
13 attaching these to the human body.

14
15 The prosthetic device has to attach the false organism, this artificial thing
16 which is human made, it is artificial, it is synthetic, has to connect, has to
17 integrate with the false organism and the success of its functioning, depends
18 on how well we handle the integration.

19
20 So by analogy, our buildings are built environments, not just buildings but
21 also bridges, roads and drains and structure utilities. These equivalent
22 prosthetic devices, and they are equivalent to the host organism, the biosphere.

23 So everything depends on success of bio integration.

24 So this is another view of green design, and how we integrate physically
25 sustainly and temporally.

26

1 So physically means first integrating with the physical features of ecology and
2 environment, because every site and every location is different so we have to
3 understand the location in the same way that when we attach the prosthetic
4 device to the body we have to find the base of the body and have attach the
5 device to it.

6
7 Sustainly means integrating with the eco-systemic process because that's the
8 carbon cycle, that's the nitrogen cycle, the first process that I think the basis in
9 nature.

10
11 And temporally is the conservation of non renewable resources and renewable
12 resources.

13
14 And so to me, bio-integration, is the effect of these three components, physical
15 integration with the existing features and ecologic environment, sustaining
16 with the eco systemic processes and thirdly temporally with the use of
17 resources.

18
19 I haven't got the time to go through all of these three, but I'll just go through
20 one which is physical integration.

21
22 So in the same way that we replace the old hip joint with the new hip joint,
23 then the substrata of the organic body has to be understood.
24 Otherwise there'll be a dislocation. And so in the same way we have to
25 understand the ecology of the site in which we locate our buildings, our roads
26 our buildings, our infrastructures before we put in the opponent.

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How the ecologist sees nature, as consisting of different units called eco systems, and an eco system consists of plants and animals, and the physical environment and eco system define as consisting of the biological constituents, and the physical constituents for the parts, acting together to form a full.

But as an ecologist you don't know that to understand ecology of location, you know something you can do in a day, you can do in a year, in a matter we do it over several years to understand the state of succession the bio delancey of the locality and so forth.

But we don't have the luxury of time as the architectures and engineers who do this.

So, let's get back to developing this quick and shot method, which is called the layer method, they break the site into this...

They look at the site and see the layers, geology, hydrology, physiographic and so forth and they map it.

But you can't be very careful when using the method because it's a short hand, It is a quick hand, and if you look at these items on that diagram on top, and you can find them on the bottom diagram, you find that they interact with each other in very complex ways.

1 And so this is a quick method to understand ecology and location. But you
2 need to recognize it afterwards, and to cost the checking of the whole system
3 with ecologists and experts.

4
5 And so this is a system. You map the different layers, you overlay it, you out a
6 summing map with grid over it to understand the points, and finally on the
7 right hand site you have what you call a composite map, which become a
8 guide to planning on the site, where you can put buildings, where you can put
9 roads, which part of the site you shouldn't touch and so forth.

10
11 These maps are something like this, and the composite maps the ones on the
12 bottom right.

13
14 I started to develop a text only of sites, so that when I look on the site for the
15 first time I ask myself , what sort of site is it, does it an ecology mature site
16 like a pristine eco-system, like a rainforest, is it an ecology mature site which
17 is a site which is partially affected, is it a mixed artificial site which is partly
18 human made and partly natural like a landscape, was that one species like
19 agricultural land, is it a zero culture, like an urban location where the forests
20 gone and the only thing that you left is probably the bedrock and the new
21 vegetation on top of it if you're lucky, and then, you know, and hydrology
22 which is probably significantly affected.

23 And finally there's the contended that is on the site

24
25 For the first sketched use of sites, you have to map it.

26 The last to the zero culture, you don't have to because there's no ecology left.

1 What you see on this table, as you like a guide for site planning, a guide for
2 design.

3 The first table, the first column, Identifies the site that you're dealing with, the
4 second column tells you what information you need before you can start
5 designing, and the third column tells you what objective should be of your
6 design for the particle project and for the particle site.

7

8 Here's an example of the photo maps we've done as the key study and you can
9 see the mapping on the top row and the bottom row, and the bottom right is
10 the composite map.

11 And this is the monoculture site, so this is the strategy, the information you
12 need, and the map you can see on the left side, the composite sites tell us
13 where we can locate buildings, on the red pass of the site, with some care on
14 the orange, but never on the blue pass of the site.

15

16 And you can see the mass on the right side which is correlates with this pattern
17 and the overhead view of the scheme, where there's the ecological fingers, that
18 goes from the green ring into the building.

19

20 Temporal is about designing with the right consumption of your resources
21 which has to do with materials, and non removal sources and so forth.

22 The third proposition I want to represent to you today is green design as eco-
23 nemesi.

24 There is a movement today called bio nemesi. Which is by Janine Benyus, in
25 the famous book, but I call it eco mimesis because it is imitating not nature but

1 specifically generally imitating biological systems, but imitating ecological
2 systems.

3

4 Because ecological systems have existed in state of stasis, before we have
5 human beings have disrupted them.

6 And if you look into ecological systems. You find many properties, processes
7 and structure that indicate a potential stability.

8 So for instance, in nature, the energy is depended on photosynthetic, the major
9 source of energy Is from the sun, and whereas our sources is really
10 significantly from fossil fuels, and in nature the structure has both parting a-
11 biotic components, acting together whereas we tend to be almost entirely a-
12 biotic.

13

14 And so, even materials in nature, everything is recycled.

15 The food of on organism, the waste of one organism, becomes the food of the
16 other.

17 Now if you imitate this we head towards zero waste. Everything is re-used,
18 recycled, and if you cannot reuse and recycled within the enviourment, we re
19 introduce back into the nature and we integrate it, so Elma Durmisevic will
20 talk about her ideas about design for this assembly.

21

22 So, I'll just take one of these, and that nature as you can see here, has both
23 biotic and a-biotic components. And so back to this diagram, what you'll find
24 is that everything that we make as architects, and engineers, is almost entirely
25 a biotic. In-organic. And when you take a room like this, everything in this

1 room is inorganic, you only got organic components- are you and me and the
2 bugs.

3 So where are the biotic components? So if we want to imitate nature we have
4 to find a balance of these two. And tramp with them together in a holistic way.

5

6 This is if you like an agenda, this I was trying to resolve in my work, and I
7 have to tell you that it hadn't been totally 100% successful.

8 So the first idea was to put it on one location as you see, in central park in
9 New York, where you can.. in all the vegetation and the secondary parts in
10 New York, and you can see the bottom diagram, where we put all the green in
11 one position.

12

13 The second pattern in this first pattern of planting, like George in London
14 when you see green squares, Leister Square, Huston Square, Rustle Square,
15 and so forth, and of course you have this patchy spotty relationship that you
16 see in the bottom diagram when you transport into buildings.

17

18 So if you like these are like icons, or these are, idea-grams, to help me design,
19 And now early work in the late 80's, this is a building that we completed 30
20 story building, vegetation on the outside, and when it was completed my
21 friends called it the hairiest building in the world.

22 Because it's hairy. It's this fuzzy. And to me this is an enigmatic emblematic
23 image for me because I believe that green architecture should have its own
24 aesthetic.

25

1 But what is the green aesthetic? And that is something I'm trying to discover
2 for a good part of my life. And I believe that it's not pristine, if it's fuzzy if it's
3 hairy, if it's has veggie in it, and it looks green.

4 The other day I was with some friends and clients, and they drove me around
5 Chicago, and my clients said- 'oh, that's the green building'. And my client
6 said 'well it looks like any other building', and my friend said 'That's a green
7 building, And my client said 'well it looks like any other building', and my
8 friend said 'Well it's lead platinum' And he said 'It still looks like any other
9 building'. So I think a green building should be green.

10 It should look green, it should healthy green, it should look unashamedly
11 green, and so this is something I try to do in my work, you can see the green
12 sticking out, and you can see the terraces with the green, so every corner of it
13 you can find there's a green, and on the coarser front site of building, so that's
14 also in the inside, by reducing that load on the floor plate, and all the elevators
15 and the staircases and the toilets, have natural ventilation, so they do not need
16 to be pressurized, and in this way we can reduce energy consumption, in the
17 first cause.

18 So the idea of, however this is not a link building. The vegetation is patchy
19 and of course in nature it doesn't have to be 100% linked to be affective,
20 there are species like butterflies and insects and birds, they go from one patch
21 to other patch without being physically linked, but ideally we should make it
22 linked.

23
24 And so the ideal of pattern for me is the one on the far right, in plan it serves
25 the ecological corridors, the fingers that eat into the heart scale, and on the
26 right side, bottom side, I called it integrating pattern, where the vegetation of

1 the biotic component start from the ground and reused continuously from the
2 ground to the top of the building.

3 From the ecologist point of view, the last patterns preferred because they
4 enable species immigration, and enables better speakers immigration, and
5 generally larger habitats and resources, and as a result ecologists contended
6 that this mix enhances the diversity and it makes it much more stable.

7

8 So with these simple ideas I started to do the drawings for myself, and that in
9 some ways this is hardly work, we have an idea, we draw it, and then the
10 drawing becomes the inspiration for other architecture.

11

12 This is a hypothetical scheme I designed, for my friend Kisho Kurokawa, the
13 late Japanese architect, who suggested that I designed the tower in Japan,
14 based on this idea.

15

16 Around the time in the late 80's, I started looking at different ways I could
17 bring vegetation up the building, so this is an early idea were I had a series of
18 planted boxes, and you can see the planted box has a sprinkling system that
19 feeds water fertilizer, into the planted box. The whole building becomes
20 almost like a living organism, and this is the first building for IBM, you can
21 the see the vegetation starting from the ground, climbing up the top of the
22 building and then on the other side of the building climbs up into the top as
23 well.

24

25 Another scheme, with this time expanding on this idea, I started to develop the
26 scheme, the vegetation system as a series of ramps. This is a scheme, a

1 competition that we got a second prize in, you can see the ramp on the right
2 side, climbing up to the top of the building and here there is a different
3 structure, the sun shading, and green wall and the cladding, you can see the
4 sparkling water vegetation system, and then the idea was that it's green not just
5 by itself but the surrounding buildings, in a hope that this will make Singapore
6 truly into a green city.

7
8 So the last pattern is for me the ideal. And to integrate the pattern both
9 horizontally and vertically and some are linked together.

10
11 But what happens if we bring it right down to the basement? And so this was
12 an idea that we had, for design for water front, this is the air view of the
13 scheme, and you can see we put the towers on the far end, 8 towers, 4 on one
14 side and 4 on the other side, that's on the second right as you can see we call
15 them peer towers, and then in between in the podium, the retail block with the
16 station.

17
18 And the project is basically simply presented in this series of diagrams, we
19 would take a building, we would roof top, garden it, we would monitor it from
20 the ground connected landscape, we will try to connect it to other buildings to
21 eco bridges, and then we would tuck the vegetation in as much as possible into
22 the built environment, but this time we brought a series of voids, that brings
23 the vegetation in the middle of the floor, into the basement, and we call them
24 eco cells.

25 And so these are what the eco cells are. And an eco cells are doing a number
26 of things, they first of all they let you bring vertical integration vegetation

1 from the roof right down into basement, gives an opportunity to collect the
2 water at the bottom, and if you don't like the water you can put a living system
3 there, a living machine, that brings natural ventilation into and across the
4 building in daylight.

5
6 This is a national library in Singapore that we finished in 2005, and we
7 worked with professor Lam Khee Poh, one of the speakers tonight, and he has
8 taken what we worked together to the next level. If you know 'Toys R Us'- so
9 'Simulations R Us.' So this is the eco cell in the scheme that we tried to bring
10 the vegetation into and across the building, and this is the view from the
11 ground floor, and this is what it looks like from the basement, where the
12 daylight is collected around this area.

13 This is the ground floor plan, and there are a number of eco- cells on the
14 northern part of the site and the western part of the site, and this is the building
15 from a distance.

16
17 These are some of the floor plans, so the plan that you saw earlier was the we
18 one the which plan floor ground tangle. And that the building has a theatre in
19 it, there's programming blocks, and these are the blades that stop the rain to
20 some extent, not 100% exclusion, from entering the street in between the
21 buildings, these are the 20 meter sky cross, and the 3 meter trees, within it.

22 In the process of design, we took the buildings through a wind tunnel test, so
23 this is what it looks like inside the wind tunnel and these are simulations done,
24 and these are the solar, and these are the daylight simulations, to help us
25 design the sun shades in which some of them serve as light shelves to store
26 daylight in and across the building.

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Now this is interesting because this draft tells us how important this is to not just design the building, but to control the commissioning. The building was finished in April, and you can see the energy consumption on energy efficient index to be a 183.3 for square meter, and as people start to move in, and people say- "Oh, this part of the building is too hot" and they turn up the temperature, by order it shoots up to 209 for square meter and by calibrating the building, they've got to back down to 173.

And so commissioning a building is so important, it's not just designing it but making the work after it's completed.

These were the evaluations, uses of options were about 99 percent heavier and the staff was 87.5 percent.

This is the energy part of the design state, it's a typical office building in Singapore uses 230 Kilowatts per square meters, at a design state we say we're trying to achieve 170, and eventually we got around 162 per square meter.

The building received the Singapore green mark platinum award and so for Singapore this was for the green building.

This is another green building which is now in the construction in Singapore, and things happening pretty fast in Singapore, this was developed in a competition, and we won it in march in last year, and by July we started the piling and today we're still catching up and doing drawings for construction.

First of all this is the roof top, the top view of the structure.

1 What the building has is a plant box the reels it's way around continuously on
2 the façade of the building. We straightened out the plant box, it's 1.5 km
3 outside the box, and so it's probably the single largest plant box in the world.

4
5 The site master plan was done by Zaha Hadid and the building in the bottom
6 on the left by Kisho Kurokawa, and our project is the one on the bottom there
7 and that shape was originally done by Zaha, by people who took over what
8 she's done, and that's our building on top of that site, and this is a continuous
9 planting system that reaches it's way up some of the plants.

10
11 But in the middle of the building we have a shaft that brings day light to the
12 left part of the building, in the left and the bottom left is the eco-cell which
13 brings vegetation down to a water retention, up on, in the building, which
14 stores harvest green water, I couldn't get enough rain water for a good part of
15 the year, but the client refuses to spend money so I have now rain water stored
16 for three days, and then you can see the red dot line is the green spiraling
17 system reaches it's way up, but on the right block that solar shaft is just like a
18 daylight shaft, that brings daylight in and across the building, and all the way
19 down to the ground, so if you like it's an angled atrium.

20
21 Now, this is to me the fourth or next generation in green buildings, or putting
22 vegetation buildings. This building, these two towers, of the family that pays
23 the highest income tax in Malaysia And so they said- can you design a green
24 building for us?

25 And so we vegetated the façade, and then being a business-like-family they
26 said "Can we make money out of the vegetation?" So I said right. Let's grow

1 vegetables in the façade. So I'm working with Michael Gera, an expert on
2 hydroponics architecture, and so the whole south wall.. the rest so that south
3 east wall would have vegetation on it, it'll grow vegetables in a hydroponic
4 sort of way, and it'll look like something on that image on the left side, you
5 can see the cross section in the middle of the hydroponic system, that you can
6 put down and service them, and the actual tubes that you can see on the right
7 side, and so this is the next generation if you like of greener buildings that no
8 one needs to make greener, but it also produces food as it is productive.

9

10 So I'm going to close in a minute, I'm going to talk about green design, also as
11 restoring eco-systems. Making impact at the systems whole. Because we're not
12 just making buildings, making objects, but we're looking at the landscape,
13 we're looking at the entire region. And how we can make the region. Repair
14 the region. Because we as human being had done terrible things to the
15 landscape, we go on a piece of land and we chop it up, you know just like you
16 chop a cow into a burger, you know, you lay out roads you lay out buildings,
17 you cut up the green, and suddenly what was a holistic eco system becomes a
18 little pestles of pitiful green.

19

20 This is a site in Turkey, and out site out just at the bottom there, right in the
21 corner of that triangle is Istanbul, and this is what the land has been maybe a
22 hundred thousand years ago, is it forested land, it is green, And it is vegetated.

23

24 Now what we had done as human beings is just to eat the landscape. Urbanize
25 it, put agriculture and all the forest that you see is now yellow color.

1 So over a period of about 20 years, from what you see in the green, you can
2 see what happens in 2004, you know, the red color shows the green, that
3 organization is eating the landscape. Now it's not entirely the planners fault.
4 You know, a lot of this were informal housing or squatter housing, people just
5 call a nice land and then the politician say okay alright if you harvest the land
6 we will give you a title and we'll give you a rosy infrastructure in this little
7 eastern landscape.

8 So what we ought to do is to repair this, to make nature whole again, to make
9 the eco system whole again. So we saw this as green design, it's not just green
10 buildings, putting vegetation buildings, balancing biotic body. But looking at
11 the landscape as a whole and repairing it. Making it whole. We're trying to
12 link it.

13
14 And so here you are. There are intentions to link it. But how can we do this?
15 Because there's existing roads and highways and railway lines. So we came
16 with this idea of what we call the ecological bridge. So you have to sides A
17 and B, with a nasty highway in between.

18 But what happens if you bridge across it? And you vegetate it? And all of a
19 sudden what became this 2 piece of this green were it becomes linked.

20 So this way we increase the eco-system interactions, we encourage the species
21 diversity, and in the process we stable the eco system.

22
23 And so the idea was to have a series of bridges, over and under the roads, and
24 that here you link the sites, the two parts of the ecology together, and this is
25 the model of the scheme where the red squares show where the ecology brides
26 are, so in this way it had be reconnected.

1 But this costs money. So who is going to pay for this? So we came across the
2 idea that why don't we make this into single largest park that Istanbul can ever
3 have?

4 And we search in the map different activities, different vegetation we can put
5 in there, and so to make a commercial viability so in this way this is the
6 waterfall structure, this is the water flows between the lake, the inside and the
7 outside, the built environment humid infrastructure in the red, and the energy
8 in the gray, the roads and so forth, and the range of these are going to take
9 place within the site. And so if you like, it's not just a green master plan, it's a
10 design for a park and has a landscaping, and has commercial viability
11 components to it.

12

13 And you can see the red which is the green infrastructure, I'm sorry the colors
14 are very confusing. The white is the gray, and the blue is for the water
15 infrastructure.

16 So finally, I see green design as one of monitoring and rectifying the impacts.

17

18 Now this is the part where my lecture gets a bit boring. Becomes theoretical,
19 and if you wish to leave the room I wouldn't mind.

20

21 So, our society is very complex. Thousands of activities take place, you can
22 see inputs, of materials from one side of agriculture products, as it flows to our
23 human built environment, and the consumption on the site, and there are
24 thousands of activities, so you can imagine how we will be truly green how
25 complex this will be.

26

1 So now if we just take our building system as this within the circle, I put this
2 wobbly shape because I don't want to define it be reckoning it into shape, but
3 one of the key things we have to do as an architect or as a designer is to look
4 at the entire life cycle of the built system.

5

6 Now most conventional perceptual life cycles is the first impact and the
7 operation impact. But truly as an ecologist you have to be responsible for the
8 built system in this entire life cycle, so that means when it's first built, when
9 it's been used, and what happens to it at the as use of life, so the first
10 environment impact, the operation impact and the environment impact.

11 So in this way you are looking at a product.

12

13 And your output as an architect, holistically, over this entire life. You may not
14 be able to control the last few steps as life, the last aspect, as you at least plan
15 for it. In some ways, it's like having children. You know, you can plan for the
16 first impact, and what happens when they grow up, but when something goes
17 they only come back to you. So, suddenly they are 21 years old, so the end of
18 it is very important, you try and guess what will happen at the end of the use
19 of the building. So this is the true life cycle consideration, it's not just first
20 innovation, but the end use for life.

21

22 And the built system to me is not just architecture, but everything that we
23 make as human beings. Bridges, roads, toys, refrigerators, and clothing and so
24 we look at this holistically, in totality of a life.

25

26 Now the built system exists in an environment.

1 So you can see the diagram at the top. The environment is not just the site,
2 there are also the systems which are not by the site but which extend beyond
3 the site, then that's the climate and processes, then the use of energy resources
4 and then other existing built environment.

5

6 In general the relationship between the building and the environment, is inputs
7 and outputs, and so, if you take the theory, that's as a tool for understanding
8 this relationship, then the input that goes into buildings from the outside
9 environment for energy materials, food, people, and of course what happens
10 on the outside often energy which people transport, so in totality, If you truly
11 comprehend the ecology designer, then you take under consideration all these
12 factors.

13 But of course it's impossible to do this in practice, hopefully one day the
14 computer systems in the world will be able to monitor this for this is the idea.

15

16 So now if we use the symbol one, to represent the built system, it is just a
17 symbol, and 2 to represent environments, then if the symbol L represents the
18 totality, then in principle we have to account for to tell you everything that
19 goes to the building, about the impact of that on the systems, the biosphere and
20 the global energy and material sources and the simple environment, and we
21 have to be aware of what goes out, unless you know, even if there's zero
22 energy and zero waste something will go out because in nature and reality
23 that's not 100%.

24 There will always be a slippage.

1 Aware of what happens outside, goes into the building because if a building is
2 1, and the environment is 2, then L to 1 is from 2 to 1, and the sum of inputs,
3 and everything will be able to go out/

4 And then everything takes place in the building in this life cycle. And the
5 input that goes through each of these stages, and what happens it takes this
6 environment, so L is the summary and 2 means everything in this environment
7 is at the building.

8 Now you put all this together, then mathematicians call this the partition
9 matrix, where eco design is a simultaneous consideration of all these at the
10 same time. What takes place in the building, what takes place on the outside,
11 what is the input in the building and what is emitted.

12
13 Now all these are inter-related. So let's see if altitude is what takes an
14 environment changes. You know, we'll run out of fossil fuel in 10 years time.
15 And we are likely to run out of fossil fuel in 10 years time, then it's going to
16 affect the input which is from 2 to 1. If it affects the input then it's going to
17 affect what takes place in the building, it's going to affect our life style, it's
18 going to affect the way we do things, the transportations that we use, and that's
19 going to affect our output the 1 to 2, so they are all inter-related.

20
21 And so if we want to monitor all these simultaneously, we don't have to
22 complete this simultaneously, we don't have the capability to at the moment,
23 but ideally we should have to monitor this to where the relationship so that the
24 impact of one activity that we do in one part of the globe, and the consequence
25 of this we are aware of it, we can rectify it, and protect it.

26

1 And so here you are. L to 2, impacts and inputs, impacts on the system itself.
2 And so green design is much more complex than you think it is, and so I'm
3 going to conclude these are some ideas of what I think green design could be, I
4 don't think one of them is the end or you'll hear many ideas about this, in this
5 conference, here are the four systems that I tried to tabulate for you, blending
6 four armatures to create a blue green and red, bio-integration physically
7 systemically and temporally, eco-mimesis, imitate ecologic systems, restoring
8 ecologic systems that had been devastated and affected by human beings, and
9 finally monitoring and rectifying environmental impacts.

10

11

12